THE EFFECTS OF A TEACHER FEEDBACK INTERVENTION IN A VIRTUAL SCHOOL SETTING

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With a growing number of students with disabilities electing to enroll in virtual education programs, it is imperative for teachers in virtual education programs to employ evidence-based practices to ensure that instructional delivery meets the student's needs and facilitates academic success. However, there is a limited amount of quantitative research on how educators in a virtual education setting can provide feedback to students with disabilities to promote active student engagement in this isolated environment. The purpose of the study was to examine the effect of a teacher feedback intervention on the quality of teacher feedback to students provided in a virtual education system and how this factor impacts active engagement time of students with disabilities in the virtual education program. The study utilized a single-subject multiple baseline across participants research design to examine the effects of the teacher feedback intervention on improving the quality of teacher feedback as well as the effects of the quality of teacher feedback on the active engagement time of students with disabilities in the virtual education program. Results indicated that the teacher feedback intervention training had a functional relationship with the quality of feedback provided by teachers in the virtual education program. Although there was an increase in the quality of feedback provided by teachers in the virtual education setting, there was no evidence of a functional relationship between increasing the quality of teacher feedback and increasing the active engagement of students with disabilities

in the virtual education setting. All three teacher participants rated their experience with the intervention and training as effective on social validity surveys.

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PREFACE

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1.0 INTRODUCTION

Cyber education, distance education, virtual education, and online learning are all terms that have been used to describe the field of nontraditional virtual instruction (Saba, 2005). While many models exist for the structure of a virtual learning program in K-12 education, the most commonly accepted research definition of a virtual school is a form of schooling that uses online computers to provide some or all of the student's education (Russell, 2004). The conventional modes used to provide instruction in virtual instruction include independent delivery, asynchronous delivery, or synchronous delivery (Kaseman, 2000). In this new frontier of education, these different delivery models allow the student and parent to select the educational course that would best suit the student's unique needs.

In all models of instruction delivery in the virtual education environment, the central defining characteristic of virtual education is the physical separation of teacher and learner due to the nature of the online educational environment and method of instructional delivery (Keegan, 1996). However, decades of research establish that the success of an educational environment correlates to the educators who are in direct contact with the students (Darling-Hammond, 2000). The separation of teacher and learner in the virtual education environment is a factor that is imperative to examine to facilitate successful student outcomes in the virtual education environment. Post-secondary schools initially utilized the virtual education delivery model, but

K-12 virtual education programs have evolved and grown over the past decade and serve all students including students with disabilities.

Carnahan and Fulton (2013) developed a study to address several questions about the virtual school system in Pennsylvania and the population of students receiving special education services. The findings from the data collected from 2005 to 2009 noted that over this four-year span, there was a 114% increase in the number of students receiving special education services in Pennsylvania attending virtual schools. There are several unique benefits of virtual education for students with disabilities that could be potentially impacting the increase in the number of students with disabilities enrolling in virtual education programs. Students with disabilities benefit from the individualized instruction in virtual education, the use of extended time, the use of a variety of multimedia technologies, and the flexible location (Vasquez & Straub, 2012). The number of students receiving special education services is projected to increase as more school districts explore the numerous benefits of offering virtual education programs, including addressing growing student populations, scheduling conflicts, credit recovery, and meeting the needs of specific groups of students for flexibility (Saba, 2005).

Despite this evolution and growth of virtual education, there is a limited amount of published research on virtual schooling practice (Barbour & Reeves, 2009). Research on teacher and learner interaction has concluded that commercial course management systems used in virtual education environments restrict most teachers to the delivery of information rather than to the provision of engaging, authentic learning experiences (Oliver, Herrington, Herrington, & Reeves, 2007). Due to the nature of the virtual education environment and the limited opportunity for traditional teacher-learner interaction, it has been affirmed that providing

frequent and meaningful feedback to students is a critical element in virtual education environments (Jonassen et al., 2008; Moore, 2007).

With an increasing number of students transitioning from traditional schooling to virtual school, it is crucial to analyze what factors promote academic success for students in this environment. A significant factor in the literature that impacts the students' academic success was learner-teacher interaction in the virtual education environment. The review of the literature on the relationship between student interaction with teachers and student success in the virtual education environment highlights the importance of a teacher actively monitoring students understanding of the content to identify gaps in their knowledge and provide support through quality feedback (Johnson & Pitcock, 2007). Active monitoring of student progress has been a critical predictor of student success as documented by research on post-secondary online education because it helps the learner accommodate to the independent world of online learning environments (Kurtz, Beaudoin, & Sagee, 2004). Virtual teachers should communicate at the first signs of student struggle and provide detailed feedback on assignments. Quality feedback offers guidance, fosters the teacher-student connection, and ensures that students are more apt to work towards the goals set forth (Segal, Chipman, & Glaser, 2014). The effects of teacher interaction on the student success outcomes in virtual education programs uncover a pressing need for extended research in the field on evidence-based practices. Teachers can employ these evidence-based practices in the virtual education setting to be proactive in their use of interventions to provide feedback and communicate with students in this unique, isolated environment.

1.1 STATEMENT OF PROBLEM

The problem of practice will examine the quality of feedback provided by teachers instructing students with disabilities within a virtual education program. Addressing teacher feedback is imperative because for students with disabilities to make progress on academic/behavioral goals within their individualized education program, the students must be actively engaged in the virtual school environment. Active student engagement time in the virtual education environment is the time calculated that students are logging on and actively working through and completing the activities assigned in the teacher's course. Passive student engagement time in the virtual education environment would involve students not logging into their coursework, or logging into the program but not completing assignments. The problem of practice seeks to increase active student engagement time by enhancing the quality of feedback provided by teachers in the virtual education environment.

1.2 PURPOSE

The purpose of the study is to examine the influence of quality teacher feedback on a student's active engagement time in the virtual school environment and how this factor impacts the active engagement time of students with disabilities in the virtual education program. The communication process in a virtual environment involves an interactive feedback loop: students provide feedback via the assessment and teachers provide feedback on learning progress to the students. When quality, timely feedback is provided by virtual teachers, it enhances the student's content knowledge and skills as well as gives teachers valuable insight into instructional methods

(Thille et al. 2014). The specific educational practices that need to be informed by this new knowledge includes the training of both regular education professionals and special education professionals that facilitate instruction within a virtual school environment and administrators that supervise these professionals. The primary objective of the study is to change teacher behavior by improving the quality of feedback teachers provide to students with disabilities enrolled in a virtual education program.

1.3 RESEARCH QUESTIONS

1.) What are the effects of implementing a teacher feedback intervention on the quality of feedback provided by teachers in the virtual education program?

2.) What are the effects of implementing a teacher feedback intervention on the active engagement time of students with disabilities in the virtual education program?

3.) What is the social validity of implementing a feedback intervention for teachers that work with students with disabilities in the virtual education environment?

2.0 REVIEW OF LITERATURE

2.1 VIRTUAL EDUCATION DEFINITIONS

The definition of virtual schools has varied in the literature; however, for this literature review, virtual schools will be defined using the categorical definitions developed by Clark (2001), as presented in Table 1. These categorical definitions cover the entire spectrum of virtual education from kindergarten to college and offer insights into what authorities are managing these different types of virtual schools, which is essential to understand when analyzing different contextual and demographic factors within the field.

Table 1

Clark's (2001) Seven Categories of Virtual Schools

Type	Description
State-sanctioned, state-level	Virtual schools operating on a state-wide level
College and university-based	Independent university high schools or university-sponsored delivery of courses to K-12 students to prepare for college
Consortium and regionally-based	Virtual schools operated by a group of school districts
Local education agency-based	Virtual schools operated by a single school or school district
Virtual charter schools	Virtual schools created under the charter school legislation in many states, also commonly known as virtual schools.
Private virtual schools	Virtual schools operated in the same manner as a brick-and-

Table 1 continued

	mortar private school
For-profit providers of curricula, content, tools, and infrastructure	Companies that act as vendors for the delivery of course or the use of course materials

It is important to note that Waston et al. (2004) offer a classification that divides the virtual schools at the K-12 level and excludes virtual college classes. When analyzing K-12 virtual school research, the categorical definitions of these schools fall into Waston's (2004) five categories, shown in Table 2. These five categories help to delineate who is providing the education in the virtual environment and ultimately who is responsible for making sure these programs are making adequate yearly progress towards increasing student success rates within these programs.

Table 2

Waston et al.'s (2004) Categories of Virtual Schools

Type	Description
Statewide supplemental programs	Students take individual courses and enroll in a physical school or virtual school in that state. These are state authorized programs and run by state education agencies.
District- level supplemental programs	Virtual schools run by districts and not state agencies
Single-district virtual schools	Virtual schools offered by individual districts for only students in that district
Multi-district virtual schools	Virtual schools operated within one individual district but enroll students from other school districts in that state
Virtual charters	Virtual schools run by a charter from a single district and enroll students in the state. These schools connect to commercial virtual education providers outside the charter.

Due to different implementation models within different educational contexts, many terms have emerged to describe the different types of online education within virtual schooling, including e-learning, hybrid courses, asynchronous learning, and Web-based learning. Allen and Seaman (2006) developed specific definitions to help delineate these terms, provided in Table 3.

Table 3

Allen and Seaman's (2006) Virtual Terminology Definitions

Term	Definition
Online	A course where the majority or all of the content delivery is online. Online activity replaces at least 80% of seat time.
Blended/hybrid	Course that blends online and face-to-face delivery. Between 30 and 79% of the content is delivered online.
Web-facilitated	Course that uses Web-based technology to facilitate a face-to-face course. Between 1 and 29% of the content is delivered online.

Virtual schools can deliver instruction independently, asynchronously, and synchronously as defined by Ahn (2011) and presented in Table 4.

Table 4

Ahn's (2011) Delivery Model Definitions

Model	Characteristics of Model
Independent delivery	Academic work is completed independently from the instructor and others in the course
Asynchronous delivery	The virtual school provides more interaction between teacher and student than the independent delivery model; still, each student works at an almost independent pace, choosing when to access instructional materials
Synchronous delivery	This model provides the most interaction between teacher and student as both parties are required to be online at the same time

There are multiple types of virtual education programs and delivery methods that currently operate in North America, and it is crucial to note virtual schooling is predominantly a

North American phenomenon (Cavanaugh, Barbour, & Clark, 2009). Powell and Patrick (2006) found that while many other countries operate some form of Web-based or online curricular support program, of the 30 countries surveyed in their study, only Canada and the United States operate entities as true virtual educational environments.

2.2 GROWTH OF VIRTUAL EDUCATION

Research related to virtual learning programs for K-12 students began in the late 1990s, and the virtual school was first noted to be employed in the K-12 realm in 1997 in Florida per a state-funded grant (Friend & Johnston, 2005). The flexibility of the virtual education model has led to exponential growth in the field of virtual education. Approximately 600,000-700,000 K-12 public school students enrolled in online learning programs in 2005-2006, and this enrollment increased to approximately 1,030,000 students during the 2007-2008 school year. National data showed this exponential growth in a survey administered to 867 school districts (Picciano & Seaman, 2009). These evolving enrollments represent a 47% increase in enrollments in two years (Picciano & Seaman, 2009).

These enrollment figures are projected to increase as more public school districts explore the numerous benefits of offering virtual education programs, including addressing scheduling conflicts, failed courses, and meeting the needs of students by allowing them to take courses offered outside the offered curriculum (Setzer & Lewis, 2005). The growth of virtual schooling and prevalence of virtual courses in college have led some states, such as Virginia, Idaho, Alabama, Michigan, and Florida, to require students to take some online courses to graduate from high school (Corry & Stella, 2012). Stedrak et al. (2012) examined the financial growth of

virtual education and concluded that virtual education for elementary and secondary students is a $507 million market and continues to grow at an estimated annual pace of 30%.

The International Association for K-12 Online Learning has collected extensive demographic data on the current populations of students enrolled in virtual schools in the K-12 setting. According to International Association of K-12 Online Learning, in the 2011-2012 school year, there were 310,000 students enrolled full time in virtual schools (Queen & Lewis, 2011). In the 2011-2012, school year there were 1,815,400 total course enrollments in virtual education programs, and of these enrollments, 74% of the students enrolled in high school classes, 62% of the students enrolled in credit recovery classes, 47% dually enrolled in brick-and-mortar schools and virtual schools, and 29% of students were enrolled in A.P. courses (Watson et al., 2013). In the 2013-2014 school year, 28 states and the District of Columbia reported having a virtual school for a total of 478 virtual schools in the U.S. in 2013–14 (Gander, 2015). Of those 28 states, Florida reported the most of any state with a total of 182 virtual schools. The two states with the highest number of total students enrolled in virtual schools were Ohio (38,169) and Pennsylvania (36,596). Idaho had the highest percentage of total students in virtual schools (2.4 percent), followed by Ohio (2.2 percent), and Pennsylvania (2.1 percent) (Gander, 2015).

2.3 TRADITIONAL EDUCATION AND VIRTUAL EDUCATION

Previously, research on virtual education environments has focused on first defining the field and then analyzing the effectiveness of virtual education environments in the K-12 setting. Researchers sought to measure the effectiveness of virtual schooling in the K-12 setting by

comparing it to the effectiveness of traditional education in the K-12 setting. However, the amount of empirical research is limited, and there is a great deal of conflicting literature regarding the effectiveness of the virtual education model. Recently the U.S. Department of Education sought to analyze this data, conducting a meta-analysis and review of online learning studies. The U.S. Department of Education (2010) investigated the results and concluded that students in online learning environments performed moderately better than those receiving face-to-face instruction in brick-and-mortar schools. However, students in virtual education programs often are provided with additional learning time and instructional elements not received by students in traditional, face-to-face educational settings, so it is difficult to make a valid comparison (USDE, 2010). Additionally, the U.S. Department of Education cautioned researchers that there are only a small number of rigorous published studies of K–12 students in virtual education programs, so generalizing the results of these studies is not applicable in the research field (USDE, 2010).

A more recent report by Miron and Urschel (2012) provided performance results specifically for private organizations operating virtual schools, specifically K-12 Inc. These results indicated that only 27.7 % of K-12 Inc. schools met Adequate Yearly Progress (AYP) targets in 2010–2011, as compared to 52% for public schools nationwide during the same period. Miron and Urschel (2012) also found that students in schools operated by K-12 Inc. and other virtual schools are more prone to student attrition. During the 2010-2011 school year, of the 48 full-time virtual schools operated by K-12 Inc., only seven (19.4 %) had ratings indicating satisfactory progress. The on-time graduation rate for K-12 Inc. schools is 49.1 % compared to 79.4 % in public schools in states where K-12 Inc. operates (Miron & Urschel, 2012). This report reiterates the fact that a significant challenge to virtual schooling is the drop-out rate among

students who choose a virtual education option. However, it necessary to approach this data with caution since they only focus on private virtual education and not the broader spectrum of multiple virtual education delivery models, as did the U.S. Department of Education report.

2.4 BENEFITS OF VIRTUAL EDUCATION

Since current performance results for virtual schools still cannot be compared directly to traditional brick-and-mortar schools due to the different factors impacting each educational environment, stakeholders should take careful consideration when deciding to enroll students in virtual education programs. Stakeholders should examine all potential benefits and challenges of virtual education programs. The delivery model of virtual education programs does offer certain advantages over brick-and-mortar schools in meeting the challenges related to the lifestyles and learning styles of students.

One of the significant benefits of virtual education is its flexible approach to teaching and learning. This flexible delivery model can be a considerable benefit for those students who prefer virtual education programs over traditional brick-and-mortar schools (Vanourek, 2011). It is more adaptable to the needs and lifestyles of many of today's students, especially students with attendance concerns. Before the implementation of virtual education programs, if circumstances did not allow a student to attend school during traditional school hours that student would miss valuable instructional time, which would negatively affect his or her academic performance. Virtual schools make it possible for this instruction to still be accessible to students at all times of the day and night and to adapt to their life and learning styles, rather than students having to adjust to the time constraints of school operating hours.

Building upon these benefits, DiPietro (2010) highlights that virtual education is gaining recognition as an alternative to the traditional face-to-face educational setting by providing students with access to learning opportunities absent of the physical constraints of the school building. Furthermore, Lin (2011) expands the benefits of not having time and physical constraints in virtual education programs by recognizing the ability in virtual education for a single school to potentially educate students across the state.

A second significant benefit of virtual education that virtual education programs can serve entire populations of students for whom traditional classrooms are not feasible by providing increased opportunity through a choice of courses, tutoring, and supplemental services. Some examples of populations served by virtual education programs include the following: students who live in remote areas, students in homeschool settings, those hospitalized or homebound for health reasons, professional athletes, incarcerated students, or students who want to enrich their education with courses not offered in their schools (Bogden, 2003; Chaney, 2001; Patrick, 2004). Additionally, virtual education programs provide students the opportunity to take courses over holiday and summer breaks for either enrichment or course recovery (Fulton & Kober, 2002).

Finally, it is important to note that a potential benefit for parents is that there is a high level of parental involvement when parents and their children select virtual education as their school of choice because it requires parents to find a program, explore the benefits, and enroll their children in a virtual education program. Beck et al. (2014) addressed student perception of virtual education by using student and parent surveys at a virtual charter school where special education students account for 26% of the student body to assess overall satisfaction in the virtual school environment. Findings by Beck et al. (2014) indicate that special education

students and their parents were more likely than general education students and parents to mention behavioral issues as the reason for their decision to choose the virtual school environment and indicated higher satisfaction levels with their decision to transfer to virtual education.

2.5 CHALLENGES OF VIRTUAL EDUCATION

While there are many benefits for students in virtual education, students do face significant challenges in the virtual education environment. Some students may choose virtual schooling because from the outside looking in it may appear to be a less challenging option than a brick-and-mortar school where physical time requirements exist. However, in virtual education, a significant student-related element for being successful in the virtual education environment is a student having the discipline and motivation to put in the instructional time without authority figures such as teachers and parents being present at all times to physically monitor work completion (Barbour, 2012).

Self-discipline can be a challenge in any setting, but especially in a virtual environment without direct human social interaction. This lack of interaction can also lead to feelings of isolation from school and other adult and peer figures (Barbour et al., 2012). Additionally, most virtual schools lack extra-curricular activities, which are essential K-12 experiences that students often lose in the virtual setting, furthering the sense of isolation. Barbour et al. (2012) found that a lack of a sense of school community also exists among virtual school students, and this separation can lead to adverse academic outcomes for students due to the disconnect from the school community.

A significant challenge in virtual education for the parental stakeholders includes the amount of help parents can provide academically for their child in their home and if parents can efficiently help their child in virtual education. To investigate this challenge, Borup (2016) used focus groups within a case study to understand how teachers perceived and supported parents' attempts to support their online students at a single online charter school. Borup's (2016) findings indicated that teachers observed multiple ways in which parents helped their students including (a) organizing and managing students' schedules, (b) nurturing relationships and interactions, (c) monitoring and motivating student engagement, and (d) instructing students when necessary. Again a tension arose in the focus group because teachers believed that parents could act as obstacles to their students' learning by being overly engaging and having continuous access to the virtual school environment. There could be potential challenges in parent-teacher relationships and interactions in the virtual education setting.

One major challenge discussed in the literature on the educator/administrator facet of virtual education includes the possibility of virtual learning to raise costs in education and eliminate jobs. Funding for virtual schools varies depending on the state. Some are funded directly by the state, while local school districts may support others. A significant concern is the fact that funding for virtual schools does not necessarily correspond with the number of students they educate, or by what it costs to operate them (Miron, 2012). For example, Miron and Urschel (2012) report that in the State of Colorado virtual schools are funded based on their enrollments by October 1 each year. However, if students drop out after October 1st, virtual education programs are not required to return the funds provided by the state. These student dropouts can result in virtual school providers receiving funding for some students to whom they offered little

or no instruction and abusing state and federal education budgets and tax dollars at the cost of funding for brick-and-mortar schools.

2.6 LEARNER CHARACTERISTICS OF STUDENTS

The review of the literature surrounding the theme of the relationship between student demographics and success in the virtual education environment yield significant results that can be used to focus future intervention studies on targeted at-risk students in the virtual education environment. Demographic information indicates that full-time online students performed better than part-time online students (Liu & Cavanaugh, 2012). Demographic data also showed a negative correlation between final exams scores in virtual education programs for students qualifying for free and reduced lunch (Liu & Cavanaugh, 2011). Demographic data showed a positive correlation for students with IEPs on final exam scores in virtual education programs (Liu & Cavanaugh, 2011). Demographic analyses indicate that past measured performance had a significant relationship to present measured performance. Overall, the logistical analysis demonstrated that cognitive student characteristics had a strong correlation to course success in virtual education programs (Roblyer et al. 2008).

In a study using document collection conducted by Wang, Shannon, and Ross (2013), the researchers sought to investigate the effect of various factors on student academic achievement in science courses a K-12 virtual education program, including learner characteristics. The method of the study utilized data collected during the 2007-2008 academic year from one mid-western state virtual school. The data points collected were coded and analyzed to examine different characteristics that made the learner successful in completing the course. Learner

characteristics included learner's cognitive ability such as locus of control, prior technology skills, learning styles, and self-responsibility. Wang, Shannon, and Ross (2013) additionally noted that a significant factor in students' success was the learning environments characteristics. Learning environment characteristics included technical support, course content area, and accessibility to the Internet.

The review of the literature surrounding the theme of the relationship between the level of student motivation and student success in the virtual education environment yield significant results to validate the importance of examining motivation factors in the virtual education environment. In a study regarding motivation in a math course in a virtual high school, data showed that high performing students and low performing students differed throughout the course. High performing students started the semester with the higher level of effort regulation than low performing students, and they maintained their superior level of effort regulation to low performing students throughout the semester. (Kim et al. 2015). The higher the level of student effort regulation, the higher their achievement (Kim et al. 2015). Metacognitive regulation of both high performing students and low performing students decreased throughout the semester (Kim et al. 2015). The motivation factors are essential to examine as researchers develop instruments that could potentially measure student readiness to engage in the virtual environment due to their motivation and academic levels.

Teacher support is another major factor in students finding success in the virtual environment (Easton, 2003). Communication practices of the teachers in virtual education are used to promote teacher-student connections that establish a foundation for engaging and motivating students' interaction with the course content. Research in the post-secondary setting by Coppa (2004) indicates a positive correlation between the formation of student-teacher

relationships and student learning. However, the impact of teacher-student relationships on the students' engagement in the course appears to play a more influential role in the context of virtual high school courses. This research has currently defined this role of support as *presence* (Swan, 2004). Teachers can demonstrate their presence in the course by replying to students' postings on the discussion boards, providing quick feedback on assignments, and being responsive to the students' questions and concerns (Woo & Reeves, 2007).

Research on post-secondary online learning documents the effectiveness of student-centered practices (McCombs & Vakilia, 2005). Johnson & Pitcock (2007) highlight the importance of a teacher's actively monitoring of students understanding of the content to identify gaps in their knowledge and provide support. Active monitoring of student progress has been a critical predictor of student success as documented by post-secondary online research because it helps the learner acclimate to the independent nature of online learning environments (Kurtz, Beaudoin, & Sagee, 2004). In a study conducted in Britain by Borup, Graham, and Drysdale (2014), the researchers used interviews to add research to the existing field of teacher effectiveness in an online environment. Research indicates that teacher support is a core practice of successful post-secondary online teachers use to redirect or correct students' knowledge (Anderson, 2004).

Researchers have called for additional research into the factors that affect student success in virtual school environments (Clark, 2008). The Educational Success Prediction Instrument (ESPRI) developed by Robyler et al. (2008) has identified four variables or characteristics that affect success in a virtual school environment. The Educational Success Prediction Instrument (ESPRI), is a survey that examines student beliefs in four areas: technology use/self-efficacy, academic risk-taking, organization, and achievement (Robyler & Marshall, 2008). Continued

research utilizing this tool could expand the research field on learner characteristics of successful students in virtual education environments. The use of this tool could be crucial when parents, students, and teachers are considering student placements in virtual education environments.

2.7 TYPES OF STUDENT INTERACTIONS

The review of the literature surrounding the theme of the relationship between student interaction with other students in the virtual education environment and student success in the virtual education environment yield significant results to validate the importance of student-to-student interactions in the virtual education environment (Borup, Graham & Davis, 2013). In a study conducted by Borup, Graham and Davis (2013), results found a positive effect on learner-learner interaction (Borup, Graham, & Davies, 2013). Learner-learner interactions had motivational effects similar to their learner-instructor interactions. (Borup, Graham, & Davies, 2013). The researchers noted a significant correlation between the time spent on learner-learner interactions and course outcomes (Borup, Graham, & Davies, 2013). The interaction between students in virtual education programs will differ depending on the facilitation of the virtual education program and what functions the virtual programming offers concerning learner-learner interaction.

Borup (2016) used focus groups at a full-time online charter high school to examine teacher perceptions of learner-learner interactions. Four student behaviors that positively impacted student engagement and learning included befriending, motivating, instructing, and collaborating in the virtual education program. Borup (2016) also used focus groups of teachers to identify several drawbacks to learner-learner interactions such as bullying and cheating. In the

focus group, the issue arose that there was tension among teachers between providing for students' individual needs and requiring collaborative learning opportunities in the virtual education program. Borup (2016) validates the usefulness of focus groups for identifying characteristics of stakeholders within a new, growing setting in virtual education.

The review of the literature surrounding the theme of the relationship between student interaction with teachers and student success in the virtual education environment yield mixed results. Some studies note a positive effect on teacher interaction (Borup, Graham, & Davies, 2013; Dubuclet, Lou, & MacGregor, 2015). Other studies indicate a minimal correlation (Hawkins et al., 2013; Liu & Cavanaugh, 2011). These mixed results could be due to the nature and quality of interactions as well as the design of teacher-student interaction in that individual virtual education setting. The communication between teachers and students in virtual education programs will differ depending on the structure and facilitation of the virtual education program and what functions the virtual programming structure offers concerning teacher-learner interaction.

Liu and Cavanaugh (2012) conducted a study during the 2007-08 academic year from one state-endorsed virtual school in the Midwestern U.S. region to examine variables of interest. These variables related to teacher-learner interaction included the following: teacher comments, the number of times students log into the learning management system, the time students worked in the program, and student demographic information, and students' status (full or part-time) in the virtual learning environment in comparison to the dependent variable of students' final grade (Liu & Cavanaugh, 2012). The study found positive and significant effects for the influence of teacher comments on students' final grades, which demonstrates that teacher interaction is an

essential factor that can be leveraged to promote student success in the virtual education environment (Liu & Cavanaugh, 2012).

In a study conducted with high school English classes in virtual education, students reported that learner-instructor interactions were significantly more motivational than learner-content interactions. The study found a significant correlation between the time students spent on human interaction and course satisfaction or improvement in content disposition (Borup, Graham, & Davies, 2013). In a similar study, a virtual school in a southern state had three secondary school courses that were taught by the same instructor, and the researchers sought to examine the effects of teacher interaction by examining the teacher contributions to discussion board forums and posts. Results indicated that the teacher's role in online discussions is influential to student participation and learning (Dubuclet et al., 2015). As discussion forums are an integral part of many virtual education programs, it is imperative to examine the role of the teacher in these assignments and use this information to facilitate more active discussion boards that focus on increasing the rigor of academic discussion as well as teacher-learner interactions.

A final study completed with 2,269 students in a Utah virtual high school addressed teacher interaction by studying three types of interaction: feedback interaction, procedural interaction, and social interaction. The regression of these variables indicates that an increase in the quality and frequency of teacher interaction resulted in an increased probability of course completion (Hawkins et al., 2013). It is imperative for teachers in virtual programs to understand the importance of their interactions with students and that these interactions can impact student success in virtual education programs.

There is an interesting contrast in the literature on teacher-learner interactions: teacher interactions improve course completion and engagement, but teacher interaction does not always

correlate with grades. While the study conducted by Liu and Cavanaugh (2011) demonstrated positive correlations in time engaged in the learning management system for students taking Biology courses in a virtual education program, yet there was no significant impact of teacher comments on final exam scores (Liu & Cavanaugh, 2011). Similarly, in the study conducted by Hawkins et al. (2013), there was an increase in course completion due to teacher interaction, but there was a minimal influence on the grade awarded as a result of the quality and frequency of interactions (Hawkins et al. 2013). Since teacher interaction does facilitate course engagement, it will be important for researchers to examine if there are more targeted interventions that can impact students' grades as well as their participation rates.

The final type of student interaction in the virtual education environment centers on the student's interaction with the educational content or curriculum provided by the virtual education program. The review of the literature surrounding the theme of the relationship between student interaction with the content in the virtual education environment and student success in the virtual education environment yields significant results to validate the importance of student interaction with quality content in the virtual education environment. Several studies highlighted in this literature review note a positive effect on the student to content interaction (Borup, Graham, & Davies, 2013; Dubuclet, Lou, & MacGregor, 2015; Hughes et al., 2007; Liu & Cavanaugh, 2012; Liu & Cavanaugh, 2011). The interaction between students and content in virtual education programs will differ depending on virtual education program and what functions the virtual programming offers concerning the student's interaction with the content.

One of the significant factors examined in the literature is the amount of time that students are engaging with the content. In a study conducted by Liu and Cavanaugh (2012) in algebra courses in virtual education programs, the influence of the time students logged into the

virtual education program software was found to be positive and significant for student-content interactions in Algebra I (Liu & Cavanaugh, 2012). Furthermore, in a similar study conducted in Biology courses, the influence of the time students logged into the virtual education program was found to be positive and significant for both groups of Biology students for student-content interaction (Liu & Cavanaugh, 2011). Conversely, in other studies, there were mixed results. In a study conducted with high school English classes in virtual education, no significant correlation existed between the time students reported interacting with course materials and their course outcomes in the virtual education programs (Borup, Graham, & Davies, 2013).

2.8 EVIDENCE-BASED PRACTICES IN VIRTUAL EDUCATION

Currently, there is little research on successful online teaching preparation in the K-12 realm. Kennedy and Archambault (2012) further note that while enrollment in K-12 online learning is growing exponentially throughout the U.S., only 1.3 % of those who responded and are involved with teacher education programs felt that prepared to teach in a virtual education environment. Classroom management is an area utterly unexplored by existing virtual school research (Kennedy & Archambault, 2012). Teachers must also address safety issues in course environments, unique to the virtual teaching experience, and prevent virtual bullying between learners. However, because teachers work in a virtual setting, they quite often do not get the same level of support from other teachers and administration. Using qualitative analysis of eight virtual high school teachers, Hawkins et al. (2012) reported that teachers conveyed a sense of disconnection from their students, the profession, and their peers as a result of limited interactions due to significant institutional barriers.

Understanding the current pedagogy in existing K-12 virtual education programs is vital to the field because of the critical role of teachers in student success outcomes in the virtual education program (Clark, 2008). This unique type of virtual education pedagogy requires empirical research be completed to see what are evidence-based practices in virtual education. There is a current need in the field of virtual education research for studies that are focused on the unique context of K-12 virtual education programs and the practices virtual school teachers use to select and implement instructional methods that are appropriate for the individual student population in virtual education. Currently, research supports that it is crucial for online teachers to appropriately pair activities that are best suited for the instructional context as well as the student population (Anderson, 2004). Research addressing this need can inform the development of training programs for preservice teachers and better prepare teachers to take on the unique roles of virtual educators (Davis & Niederhauser, 2007).

The exponential growth of K-12 virtual education in all of its various contexts is outpacing the research and data that support best practices. Due to a lack of data, decision making by administrators on what is an effective practice in virtual education programs has essentially become a process of trial-and-error. Barbour (2011) states that the growth and implementation of virtual schooling, unfortunately, have preceded the production of reliable and valid research. Additionally, Barbour et al. (2012) concluded that the limited published research available has primarily excluded the perspectives of all students engaged in virtual education programs. The research is one-sided, based on individual settings, and lacking input from one of its most important stakeholders, the students.

2.9 INDICATORS OF QUALITY FEEDBACK

Teacher monitoring and teacher feedback of student progress are critical predictors of student success as documented by post-secondary online research because they help the learner adapt to the independent nature of online learning environments (Kurtz, Beaudoin, & Sagee, 2004). Understanding students' expectations and values regarding feedback have important implications for online learning since students deploy a variety of individual perceptions, processes, and behaviors to construct their learning during self-directed learning in virtual education environments (Zimmerman & Schunk, 2001). The assessment process involves an interactive feedback loop: students provide feedback via the assessment and teachers provide feedback on learning progress to the students. This cycle enhances the students' content knowledge and skills as well as provides teachers valuable insight into instructional methods (Thille et al. 2014).

In the research, there are four significant themes regarding quality feedback. The first indicator of quality feedback is that feedback is timely. Koedinger, Anderson, Hadley, and Mark (1997) assert that immediate feedback is a critical aspect in supporting individualized instruction and student motivation. The second indicator of quality feedback is that it is quantitative and objective. Feedback should be realistic and should include a quantitative score related to the assignment. Having clear criteria or guidelines provided to students before the assignment creates transparency and gives an understanding of the expectations (Segal, Chipman, & Glaser, 2014). The third indicator is that feedback provides positive reinforcement. Feedback should be positive to promote student growth (Segal, Chipman, & Glaser, 2014). The final indicator of quality feedback is that it offers constructive criticism. Providing robust feedback that targeted students' conceptual misunderstandings and highlights potential errors in addition to providing

them resources related to identified errors to correct errors promotes meaningful metacognitive processing for students (Segal, Chipman, & Glaser, 2014).

2.10 SPECIAL EDUCATION IN VIRTUAL EDUCATION

In a study conducted by Shellie and Lindsay (2006), the researchers gathered descriptive statistics on the number of students with Individualized Education Plans enrolled in virtual schools in Pennsylvania. At the time of the study by Shellie and Lindsay (2006), the PA Virtual Charter School served 353 students who had Individualized Education Plans. There are several unique benefits of virtual education for students with disabilities in virtual education programs. Students with disabilities benefit from virtual education as a result of the individualized instruction in virtual education and the use of extended time, the use of a variety of multimedia technologies, and flexible location, which are benefits of virtual education programs (Vasquez & Straub, 2012). For students with learning disabilities, various multimedia technology has been found helpful in developing literacy skills (Vasquez & Straub, 2012).

During the Individuals with Disabilities Education Act reauthorization in 2004, virtual education was a relatively small part of the educational landscape and as a result, is not addressed in the reauthorization (Individuals with Disabilities Education Act, 20 U.S.C. § 1400, 2004). However, since 2004, both the number of virtual schools and the number of students enrolled in virtual schools has experienced substantial growth. This growth has remained unaddressed by IDEA legal guidelines as evidenced by a complete failure to include any legislation aimed at online schooling in public settings or virtual charters. This absence of legislation should be alarming to special educators in virtual schools because some of the core

aims of IDEA do not account for the reality of virtual education programs and the characteristics of these unique environments.

A prime example lies in the behavioral aspects of special education because, due to the instructional delivery model for virtual education programs, it is nearly impossible for instructors to assess student behaviors accurately. Teachers are unable to observe student interactional and communicative behaviors in a virtual environment, which makes it challenging to support students with identified cognitive and behavioral disabilities. In independent and asynchronous models, the teacher may never observe the student's interactional behavior since both teacher and student are never required to share time online. In synchronous models, the teacher and student may share online time, but there is no mandate that the teacher and student see or hear each other directly. To date, there is no research documenting the relative efficacy of this lack in behavioral intervention implementation in virtual education.

An additional related service that is nearly impossible to implement with fidelity in virtual education includes counseling, which is a crucial component for many IEPs, particularly with students diagnosed with severe emotional disturbance. Counseling and other support services are vital to the K-12 experiences and are difficult to duplicate with an equal level of success when comparing the virtual education setting to the traditional, face-to-face educational setting due to the nature and delivery of counseling services. It is important to note that because some of these services are legally required, they pose significant challenges for virtual school providers. Curry (2010) indicates this potential area for exploration in the research field of virtual education; as the trend towards online virtual educational programs continues to grow, attention to services such as student counseling merits careful consideration when developing new approaches to providing counseling services in this setting. The challenge that the research

field should address is the ability of the virtual school to provide those services while also providing the same level of confidentially and quality.

Additionally, while virtual education programs are not exempt from also having to provide quality Americans with Disabilities Act accommodations for universal design, these virtual education programs do benefit from developers of learning management systems and other digital tools used for virtual and online instruction required to be ADA compliant from the very development of these learning management systems. These learning management tools provide a range of speech and touch activated devices, which make it easier for students to have instructional access in a virtual environment. A significant study by Repetto et al. (2010) noted that one approach to increasing graduation rates in virtual education programs is to design learning management systems compliant with ADA that serve students with disabilities through the 5Cs known to increase school completion: connect, climate, control, curriculum, and caring community. This research indicates that virtual school programs, aligned with the 5Cs, have closed achievement gaps and increased completion rates among students with disabilities.

Barbour (2012) pointed out that technology and online learning will have no impact on student achievement unless they also change how instruction is designed, delivered, and supported through the use of universal design best practices. Furthermore, Abrego and Pankake (2010) indicate the importance of the role school administrators play when it comes to implementing and sustaining online technology that promotes universal design. To meet the requirements for universal design, the technology used in virtual education must be reliable, simple for end users to navigate, and adequately supported. Course design under universal design guidelines should be engaging, using multiple instructional approaches to appeal to diverse learning styles. DeNisco (2013) advocated that with online instruction comes a change

in teaching, communicating with, and assessing students. Further research in the field should address feasible ways for teachers in virtual education programs to make these changes.

A further consideration regarding special education in virtual education programs is that IDEA (2004) requires that all teachers providing instruction to students with disabilities meet the highly qualified teacher standard as outlined in the Elementary and Secondary Education Act (ESSA; reauthorized in 2001 as No Child Left Behind). Currently, most states do not have specific training programs on effective virtual education in teacher preparation programs. Furthermore, in virtual education programs, students spend a great deal of time at home with their parents, and sometimes the parents can default to fulfilling the role of the teacher

A final consideration of IDEA with regard to virtual education occurs when considering the concept of the least restrictive environment (LRE), which is a legal requirement for all students with disabilities under IDEA 2004. However, a virtual school can be a placement that foregoes regular classroom instruction, special class instruction, and instruction in alternative schools. Any concept of LRE is null and void when applying least restrictive environment to virtual schools. The individualized and segregated nature of virtual schooling contradicts the least restrictive environment principle of IDEA, and since there is not a class of regular peers to implement inclusion, inclusion does not exist in virtual education. However, researchers also have conflicting opinions on this essential component of IDEA. Schwartz (2012) argues that virtual schooling is a more restrictive environment than the traditional classroom setting because it precludes students from interacting with peers. To the contrary, Rhim and Kowal (2008) disagree on one primary issue: where do we start the examination of virtual charters concerning the continuum of alternative placements? Courts have yet to offer guidance on this crucial issue.

2.11 CONCLUSION

Emerging research has focused on two significant factors in online learning: research on learner characteristics that promote success and research on learning environment characteristics that support success (Roblyer & Davis, 2008). It is imperative to introduce and analyze significant themes emerging in the literature, and it is worth setting them within the current context of K-12 virtual education and similar research on effective practices for virtual education environments for students with and without disabilities.

One major theme that emerged in the research was the interactions of the student with teachers, other students, and content in the virtual education environment and the student's success in the program. A second major theme was students' motivations and perceptions within the virtual school setting; and within this category emerges one of the first significant instruments developed to focus on indicators of success in virtual education (Roblyer et al., 2008). An additional significant theme that emerged in the literature is the effect that a student's demographic can have on his or her level of success in the virtual education setting. These demographics are necessary to examine because they could lead to the targeted research of effective intervention practices for at-risk demographics. Finally, literature focusing on the unique needs of students with disabilities in virtual education will lead towards recommendations for future research.

With the growth of virtual schools in the K-12 realm, there is an essential need for more research to advance the field (Bernard, Abrami, Borokhovski, Wade, & Tamim, 2009; Black, Ferdig, & DiPietro, 2008; Simonson, Smaldino, Albright, & Zvacek, 2011). In the literature, many researchers in the field are recommending that future researchers empirically examine cases and studies. There is a call for an increase in quantitative studies in the area rather than

qualitative studies based on individual schools (Bernard, Abrami, Lou, & Borokhovski, 2004; Cavanaugh, Barbour, & Clark, 2009). While there is research in the field of online distance education, the research primarily focuses on adult learners and is not always applicable to the K-12 virtual school environment because adults learn differently from K-12 students due to differences in cognitive development (Barbour & Reeves, 2009).

Currently, limited research exists on the predictors of success in virtual education in the K-12 environment. Although teacher-learner interaction has been found to be a predictor of student success in the literature base, there has been a noted absence of single-subject research on the impact of teacher feedback on students in the virtual education environment, particularly on students with disabilities. The current research study seeks to add to the literature base by analyzing the effect of a teacher feedback intervention on teacher feedback behaviors in the virtual education environment and analyzing if there is an effect of student active engagement time in the teacher's course.

3.0 METHODS

3.1 INQUIRY SETTING

The study site was part of the Corrado (pseudonym) School District, which was a comprehensive public school system comprised of three elementary schools, a middle school, and a high school, located in southwestern Pennsylvania. The district was considered a suburban school district and encompasses the suburban areas of three communities with a combined population of an estimated 19,000 residents. The district served an estimated 3,353 students. An estimated 24% of students were identified as economically disadvantaged. Less than 1% of students were identified as English Language Learners. Enrollment data reveal the following enrollment percentages by ethnicity: 0.09% American Indian/Alaskan Native, 2.15% Asian, 2.48% African American, 1.28% Hispanic, 3.76% multi-racial, and 90.24% Caucasian.

An estimated 14.8% of students are identified and received special education services. Of the approximately 495 students receiving special education services in the district, approximately 10.1% qualify with a diagnosis of autism, 5.5% qualify for a diagnosis of emotional disturbance, 4.8% qualify with a diagnosis of intellectual disability, 13.9% qualify for a diagnosis of other health impairment, 41.6% qualify for a specific learning disability and 21.6% qualify for a speech and language impairment. Race/Ethnicity data for Corrado District indicated that of the students identified as receiving special education services, 3.0% are African American, 6.1% are

multi-racial, and 88.3% are Caucasian. Educational data for Corrado District indicated that 73% of students receiving special education services are included in the regular education environment 80% of more of the school day, 3.3% of students receiving special education services are included in the regular education environment 40% or less of the school day, and 3.9% of the students receiving special education services were included other approved education settings.

This case was selected for the study because the Corrado School District offers a virtual education program, Corrado Academy, which operated within the district and was available for students enrolled in grades K-12. Student enrollment procedures for Corrado Academy outline that enrollment entails an agreement between the school district and the student's family before enrolling in Corrado Academy. Students must be residents of Corrado school district and prove residency in the district to enroll in Corrado Academy and must maintain these residency requirements. Students and their guardians meet with the district coordinator of Corrado Academy before enrollment for training on the course software and programming utilized by Corrado Academy. There were an estimated 134 students enrolled in the virtual academy during the school year of the study (2017-2018).

Of the 134 students enrolled in Corrado Academy, approximately 55 students were enrolled full time in the virtual program. These 55 students did not attend classes in the brick-and-mortar buildings in the district but instead took all assigned courses in the virtual education environment. Two benefits for students that were enrolled full time included the fact that the Corrado Academy provided a fully online educational program aligned with courses within the Corrado District and that the program was accessible for the students without time constraints or physical constraints. An additional benefit of the Corrado Academy was that teachers from

Corrado District staffed it and offered voluntary tutoring within the brick-and-mortar schools for students. Additionally, students who enrolled in Corrado Academy received a Corrado District diploma upon graduation and had access to participate in student clubs, activities, and events with their peers within Corrado District.

Seven students enrolled in Corrado Academy were considered to be enrolled as part-time students in the Corrado Academy, which meant that students took a portion of their courses in the virtual education program Corrado Academy and a portion of their courses in the brick-and-mortar schools in the Corrado District. There were 72 students enrolled in Corrado Academy who were considered to be hybrid students. These hybrid students only took one or two courses within the virtual environment. A benefit for hybrid students in Corrado Academy was that students had the opportunity to take credit recovery courses, advanced courses, or courses that were not offered in the brick-and-mortar setting. An additional benefit for hybrid students was that they were not denied access to the desired course based on school scheduling constraints.

The study focused primarily on the high school students enrolled in the Corrado Academy and the high school teachers facilitating high school level courses in the Corrado Academy. During the recruitment phase of the study, all teacher participants who indicated interest in participating in the study were employed to teach high school courses in the Corrado Academy. A benefit to focusing the study on similar grade levels was that courses were similar in format and learners shared similarities based on their developmental stage that would not exist were the study to focus on elementary students and middle school students as well. In a single case study design across multiple participants, the participants should be similar in their behaviors and characteristics when possible to help the researcher make generalizations about behavior changes without confounding variables.

In the high school section of Corrado Academy, there were a total 118 students enrolled. Of the high school students, 46 were enrolled full time, five were enrolled part-time, and 67 were enrolled as hybrid students. Within the high school section of Corrado Academy, there were a total of 12 students that were identified as receiving special education services with an individualized education plan who were enrolled as full-time students. There were no students that were identified as receiving special education services with an individualized education plan enrolled part-time. A total of eight students were identified as receiving special education services with an individualized education plan who enrolled as hybrid students.

Of the 12 full-time Corrado Academy students with IEPs, one student was identified as receiving services with the diagnosis of autism, four students were identified as receiving special education services with the diagnosis of a specific learning disability, and seven students were identified as receiving special education services with the diagnosis of emotional disturbance. This study focused on students who are full-time Corrado Academy students that have individualized education plans because these students do not have the same level of physical access to the teacher facilitating and providing feedback in the courses that part-time or hybrid students would have due to their complete separation from the brick-and-mortar environment. The only interactions that full-time Corrado Academy students would have in person with teachers in the Corrado Academy would occur if the student attended tutoring sessions offered at their assigned brick-and-mortar schools through Corrado Academy.

It is essential to focus on the academic progress of students with disabilities in the virtual education program through Corrado Academy because for students with disabilities to make progress on goals within their individualized education program on identified academic or behavioral goals; the students must actively participate in the courses in Corrado Academy.

Teachers employed by Corrado Academy must actively engage with these at-risk students. Each student enrolled in Corrado Academy who has been identified as having a disability has a special education teacher case manager who works with the district coordinator to ensure that the student identified receives the specially designed instruction, evidence-based interventions, accommodations, modifications, and related services outlined in the student's individualized education plan. The special education teacher in Corrado Academy facilitates meetings with the IEP team for each student with all required members. Additionally, the special education teacher monitors each student's academic and behavioral goals and reports the progress to parents/guardians.

3.1.1 Student Participants

Student participants were not recruited for the study as the study did not involve student participation and focused primarily on changing the behavior of teachers when providing quality feedback in the virtual education environment. The researcher monitored and collected active student engagement data for each student paired with paired with a teacher following all IRB protocols. However, these data would be collected regardless of the study, as it is reported in the program naturally to students, parents, and teachers. There was no risk for student participants in the study, and the only non-identifiable demographic information is provided for the student participants as outlined in the following sections.

Student Participant 1 was a male student in 9th grade. The student had been in the virtual education program for two years. The student had elected to join the virtual education program in 7th grade and 8th grade. The student returned to the brick-and-mortar setting for the first quarter of his 9th grade year but then elected to return to the Corrado Academy after the first semester at

parental request. The student received special education services under the diagnosis of autism. Student Participant 1 was performing below grade level in the areas of written expression and mathematical reasoning. Prior to enrolling in Corrado Academy, Student Participant 1 received instruction in the inclusion environment with the general education with specially designed instruction in his brick-and-mortar high school. Student Participant 1 also had a goal in the area of organization and received specially designed instruction to help address this goal. Before enrolling in the Corrado Academy, Student Participant 1 received instruction in the inclusion environment with the general education curriculum and specially designed instruction in the brick-and-mortar building.

Student Participant 2 is a male student in 12th grade. The student has been in the virtual education program for four years. The student received special education services under the diagnosis of specific learning disability. Student Participant 2 was performing below grade level in the areas of written expression, reading comprehension, and mathematical reasoning. Before enrolling in the Corrado Academy, Student Participant 2 received instruction in the inclusion environment with the general education curriculum and specially designed instruction in the brick-and-mortar building.

Student Participant 3 was a male student in 12th grade. The student had been in the virtual education for four months. The student received special education services under the diagnosis of specific learning disability. Student Participant 3 was performing below grade level in the areas of written expression and reading comprehension. Before enrolling in the Corrado Academy, Student Participant 3 received instruction in the inclusion environment with the general education curriculum with specially designed instruction in the brick-and-mortar building.

3.1.2 Teacher Participants

The researcher sent a recruitment email approved by the IRB at the University of Pittsburgh to all possible teacher participants in the virtual education program. Three teachers responded and agreed to participate in the study. The researcher followed all IRB protocol when recruiting and informing potential teacher participants. There was no risk for teacher participants to participate in the study and only non-identifiable demographic information is provided for the teacher participants as outlined in the following sections.

Teacher Participant 1 was a female teacher employed in the virtual education program since August 2014. Participant 1 taught biology courses and sciences electives. Teacher Participant 1 had been a teacher in the brick-and-mortar school at the study site for 24 years and had not taught at other educational sites. Participant 1 had a Bachelor of Science in Biology. Teacher Participant 1 had teacher certification in Biology 7-12 and General Sciences 7-12. Teacher Participant 1 did not have a certification in Special Education but has worked with students with disabilities in both the brick-and-mortar educational environment and the virtual education environment. Teacher Participant 1 had completed four professional development sessions during the 2017-2018 school year that focused on evidence-based practices in special education and the utilization of evidence-based practices in inclusive classrooms. Teacher Participant 1 had worked in consultation with the special education teacher in the virtual environment.

Teacher Participant 2 was a male teacher employed in the virtual education program since August 2016. Teacher Participant 2 taught physics courses in the virtual education program. Teacher Participant 2 had been a teacher in the brick-and-mortar school at the study site for nine years and had not taught at other educational sites. Teacher Participant 2 had a

Bachelor of Science in Physics and a Masters of Education. Teacher Participant 2 had teacher certification in Physics 7-12. Teacher Participant 2 did not have a certification in Special Education but had worked with students with disabilities in both the brick-and-mortar educational environment and the virtual education environment. Teacher Participant 2 had completed four professional development sessions during the 2017-2018 school year that focused on evidence-based practices in special education and the utilization of evidence-based practices in inclusive classrooms. Teacher Participant 2 has worked in consultation with the special education teacher in the virtual environment.

Teacher Participant 3 was a female teacher employed in the virtual education program since August 2017. Teacher Participant 3 taught several math courses, including financial literacy electives that involve both math computation and elements of discussion and research projects. Teacher Participant 3 had been a teacher in the brick-and-mortar school at the study site for 23 years and had not taught at other educational sites. Teacher Participant 3 had a Bachelor of Science in Mathematics and Education. Teacher Participant 3 had teacher certification in Mathematics 7-12. Teacher Participant 3 did not have a certification in Special Education but had worked with students with disabilities in both the brick-and-mortar educational environment and the virtual education environment. Teacher Participant 3 had completed four professional development sessions during the 2017-2018 school year that focused on evidence-based practices in special education and the utilization of evidence-based practices in inclusive classrooms. Teacher Participant 3 had worked in consultation with the special education teacher in the virtual environment.

All teacher participants in the study are employed in this virtual school via a stipend position and are full-time teachers within the brick-and-mortar school high school building in the

district. It is essential to understand the nature of employment within this setting because it impacts teacher communication since the virtual position is not the teachers' primary job. Teachers in this setting did not have specific guidelines or training on how to give feedback and communicate in an online setting before the intervention study but had received instruction at the beginning of the year on how to navigate the virtual education course software to complete grading assignments.

3.2 INQUIRY QUESTIONS

The study sought to answer the following inquiry questions:

1.) What are the effects of implementing a teacher feedback intervention on the quality of feedback provided by teachers in the virtual education program?

2.) What are the effects of implementing a teacher feedback intervention on the active engagement time of students with disabilities in the virtual education program?

3.) What is the social validity of implementing a feedback intervention for teachers that work with students with disabilities in the virtual education environment?

3.3 INQUIRY APPROACH

A single case research design using multiple baselines across participants was used to address the problem of practice in a local context. By utilizing the design of single-subject multiple baseline designs across participants as an inquiry approach, the researcher was able to

introduce an independent variable across several individuals in the setting consecutively, which exhibit similar behaviors under similar conditions (Kennedy, 2005). Specifically, this single subject study concentrated on the potential for instructor-learner communication in the form of feedback to facilitate a more efficient approach to instructor-learner interaction in the virtual environment. Ideally, the feedback will foster increased student active engagement time in the virtual education environment.

Quantitative data included each teacher's feedback intervention rubric scores on the pre-intervention and post-intervention assessment. Teacher feedback intervention data were collected through scoring any assignments the teacher participant returned to student participants using the Teacher Feedback Intervention rubric. The researcher collected the data by charting and graphing the results of the single case study across multiple baselines intervention with three different teacher participants in the virtual education setting. The independent variable manipulated by the researcher focused on teacher behavior, specifically on the quality of feedback given by teachers, as evaluated by the Teacher Feedback Intervention Rubric.

The dependent variable in this study focused on student behavior, specifically on the total weekly active student engagement time. Quantitative data included the total amount of active student engagement time for each student participant for each week of the study, amassed through document collection through the virtual education program's platform. Social validity surveys were administered post-intervention to all teacher participants. Questions on the social validity survey focused on what aspects of the teacher communication intervention and professional development were useful and what elements could be changed to facilitate quality teacher feedback in the virtual education environment.

3.4 PROCEDURES

The researcher recruited all teacher participants in the study following all protocols outlined by the IRB at the University of Pittsburgh. The researcher introduced the study to all potential participants through email, and the researcher met with participants that expressed interest in the study. The email introduced the study by using the following wording: “My name is Lauren Barry, and I am completing my dissertation study on the use of a teacher feedback intervention in a virtual education setting. The purpose of this research study is to determine the effectiveness of a teacher feedback intervention on the active engagement of students with disabilities in the virtual education setting. For that reason, I will be conducting an intervention study with teachers in the virtual school program and will be asking them to complete brief training on quality feedback indicators and short weekly meetings (5-10 minutes) or phone conferences during the intervention phase. If you are interested in participating in this study, please contact me. Important: Your participation is voluntary, and you may withdraw from this project at any time. The information being collected is confidential and will be used only for the dissertation study. This information will not impact employment in any manner.” The researcher recruited all potential participants employed in the virtual education program, a total of 12 potential participants, with this email; three teachers expressed interest in participating in the study. The three teachers that expressed interest in participating in the study accepted the offer to participate in the study.

At the beginning of the study, the researcher paired a student with a disability with one of the teachers in the study who was an instructor in one of the student’s courses for purposes of tracking their total weekly active engagement time in the course. Each student paired with a teacher had an individualized education plan. Student active engagement in the course was a

natural part of the school expectations. It would occur regardless of the intervention conducted with the teachers, but data were collected to analyze the impact of the intervention on the student's total weekly active engagement time. Student data were only collected to evaluate whether the student's active engagement increased as the quality of feedback provided by the teacher increased. In this study, the researcher operationally defined student active engagement time as the time spent engaged by working on course activities, viewing instructional videos, and taking assessments in the assigned course. The virtual education program at the study site reported student active engagement time as a total amount of minutes the student engaged in the paired teacher participant's assigned course per week.

During the baseline phase of the study, the researcher collected data on the scores teacher participants received on the quality of feedback using the Teacher Feedback Intervention Rubric (See Appendix A). The operational definition of quality feedback was that the teacher provided objective feedback that includes a numerical grade, positive reinforcement, constructive criticism, and was delivered to the student within two days. The Teacher Feedback Intervention Rubric measured these four indicators of quality feedback. A teacher could earn a maximum score of 100% if all indicators are present and the teacher delivered the highest quality of feedback to the student. The indicators included the following criteria: feedback was timely and delivered within two days, feedback was objective and included a numerical score, the feedback included constructive feedback to highlight areas the student could improve, and feedback included positive reinforcement on aspects of the assignment that the student completed well.

The teachers were not instructed to use the rubric during the baseline phase; thus, the teachers' behavior was reflective of their natural behavior when giving feedback to the students. The researcher collected data on any assignments for which the teacher gave feedback to their

assigned student participant during the week, and if there were multiple assignments graded, the researcher averaged these scores to obtain an average score for the week. Average scores were utilized to account for the potential variability in the number of assignments a student might complete throughout the week. The researcher set the threshold to collect at least three points of stable data during the baseline phase for Teacher Participant 1 and all subsequent teacher participants in the study before implementing the intervention training with the teacher. During this baseline period, the researcher collected data on the total weekly amount of time the student actively engaged in the teacher's assigned course through the virtual education program at the study site. The time reported for the student's active engagement is a total weekly time, which is generated by the virtual education program.

Once the baseline phase of the intervention was complete, the researcher met with Teacher Participant 1 and delivered instruction on the intervention. The researcher used a PowerPoint (Appendix C) to instruct the participants on the indicators of quality feedback and the corresponding research. The researcher developed this PowerPoint as a professional development training for teachers in virtual education programs to improve the quality of teacher feedback. The PowerPoint training lasted approximately 15-20 minutes and was conducted in the teacher's classroom. The goal of the PowerPoint training was to instruct the teacher on the importance of quality feedback in the virtual education environment using research to support the purpose of the intervention. After reviewing the research, the researcher instructed the teacher on the four indicators of quality feedback: (a) feedback is delivered within two days of student work submission, (b) the feedback includes a numerical grade, (c) the feedback includes constructive suggestions to improve the student's work, and (d) feedback includes a positive comment on student's work. The researcher introduced the Teacher Feedback Intervention

Rubric to Teacher Participant 1 and provided a checklist of the indicators for the quality feedback rubric that the teacher can use when giving feedback to students.

The researcher then had the teacher practice giving feedback on sample student assignments related to their subject area by using the checklist to give feedback on all four indicators of quality feedback. The teacher participant was required to demonstrate mastery (using all four indicators) on at least three probes to complete the training. Once the Teacher Participant was able to demonstrate mastery on the practice probes, the Teacher Participant was instructed to use the feedback intervention rubric when providing during the week. The researcher informed the Teacher Participant that weekly check-in meetings would occur with the researcher until the teacher could have three weeks with a score of 100% on the rubric.

After Teacher Participant 1 completed the intervention phase, the researcher outlined the procedures for the maintenance phase to Teacher Participant 1. The procedures outlined for the maintenance phase for the study were that check-in meetings would occur with the researcher every other week until the participant was able to demonstrate a score of 75% or above for at least three data points. Once Teacher Participant had 1 points of stable data during the intervention phase, the procedures for intervention began with the Teacher Participant 2 and continued until all three participants had completed the intervention. After each teacher participant completed the maintenance phase of the intervention study, the researcher provided the teacher participant a social validity survey (Appendix B) that each teacher participant could complete privately and return to the researcher at their convenience. The social validity survey contained statements that were answered using a 0-6 Likert-type scale where a score of zero indicated strong disagreement, and a score of six indicated strong agreement. The questions on the social validity survey focused on surveying teacher participants to see if the teachers found it

a useful intervention to meet the needs of the virtual education environment and the purposes of the intervention. The social validity survey also sought to analyze if the procedures in the intervention were manageable for teacher participants in the study.

3.5 EVIDENCE AND DATA COLLECTION

For inquiry question 1, the researcher collected evidence through the monitoring the average weekly score on the Teacher Feedback Intervention Rubric for each teacher participant through baseline, intervention, and maintenance phases of the Teacher Feedback Intervention Rubric. The evidence collected from analyzing data in the baseline and implementation stage of the teacher communication intervention serves to demonstrate patterns in the quality and frequency of feedback by teachers in the virtual program for students with disabilities. The researcher collected baseline data by averaging the teacher's weekly feedback score using the Teacher Feedback Intervention Rubric. An average score was necessary due to the variability of the assignments a teacher may receive in a week. Once the teacher entered the intervention stage, the teacher was required to meet the criteria of three weeks with a score of 100% on the Teacher Feedback Intervention Rubric to be able to enter into the maintenance phase of the intervention. During the intervention phase of the study, the researcher held weekly meetings with the teacher participants. When the teacher successfully had three weeks of intervention with scores of 100% of the teacher feedback rubric, the teacher moved to the maintenance phase, and meetings were held every other week until the teacher has three maintenance data points with a score of 75% or above on the Teacher Feedback Intervention Rubric. The data from this inquiry question serves

to analyze the effects of the intervention training on the quality of feedback provided by each teacher participant.

For inquiry question 2, the researcher collected evidence in the form of document collection. The documents collected were records generated by the virtual education program that delineate active student engagement time in the course and passive student engagement time in the course. These documents indicate the time each student logs into the course, the total amount of time students actively complete assignments in the course, and the time the student logs out of the course. The documents report the time in total hours, minutes, and seconds for each time the student logs into the course. The login data and percentage of active learning time show clear statistics and trends in logon patterns and active student engagement time, which were analyzed to see if there was an impact on active student engagement time related to the implementation of teacher communication intervention. The data from this inquiry question would serve to analyze the effect of the use of the Teacher Feedback Intervention Rubric on student active engagement time.

For inquiry question 3, the researcher collected evidence through the use of social validity surveys administered to each teacher participant in the intervention. The social validity surveys help enhance understanding of the social validity of the designed teacher communication intervention. The survey also facilitates open communication and conversation regarding the impact of the teacher feedback on students with disabilities and how the virtual school program can develop solutions to address these issues moving forward. The data from this survey serve to examine the social validity of the designed professional development associated with the teacher feedback intervention.

3.6 ANALYSIS AND INTERPRETATION

In a single-case experimental design, the effect of a treatment is demonstrated by showing that behaviors in more than one baseline change as a consequence of the introduction of an intervention, with multiple baselines established for different individuals. The baseline and intervention data are then analyzed for patterns in teacher communication behaviors. Verification is evident if the data path changes predictably through a phase change, as from baseline to intervention.

Social validity provides the researcher with a critical measure of the social impact and importance of teacher communication intervention. Social validity analysis in this study aided the researcher in understanding if other people perceive that the targeted changes in behavior are necessary and that if the intervention used to encourage behavior change are acceptable to participants.

4.0 RESULTS

The purpose of the study was to examine the influence of implementing a single case study across multiple baselines intervention with teacher participants to increase the quality teacher feedback on a student's active engagement time in the virtual school environment. The study analyzes how this factor impacts active participation by students with disabilities in the virtual education program.

4.1 TEACHER FEEDBACK INTERVENTION

The results in Figure 1 indicate results for teacher quality of feedback scores on the rubric utilized in the intervention training (Appendix A) in an 18-week study, where intervention implementation occurred as a single case study across multiple baseline design with three teacher participants.

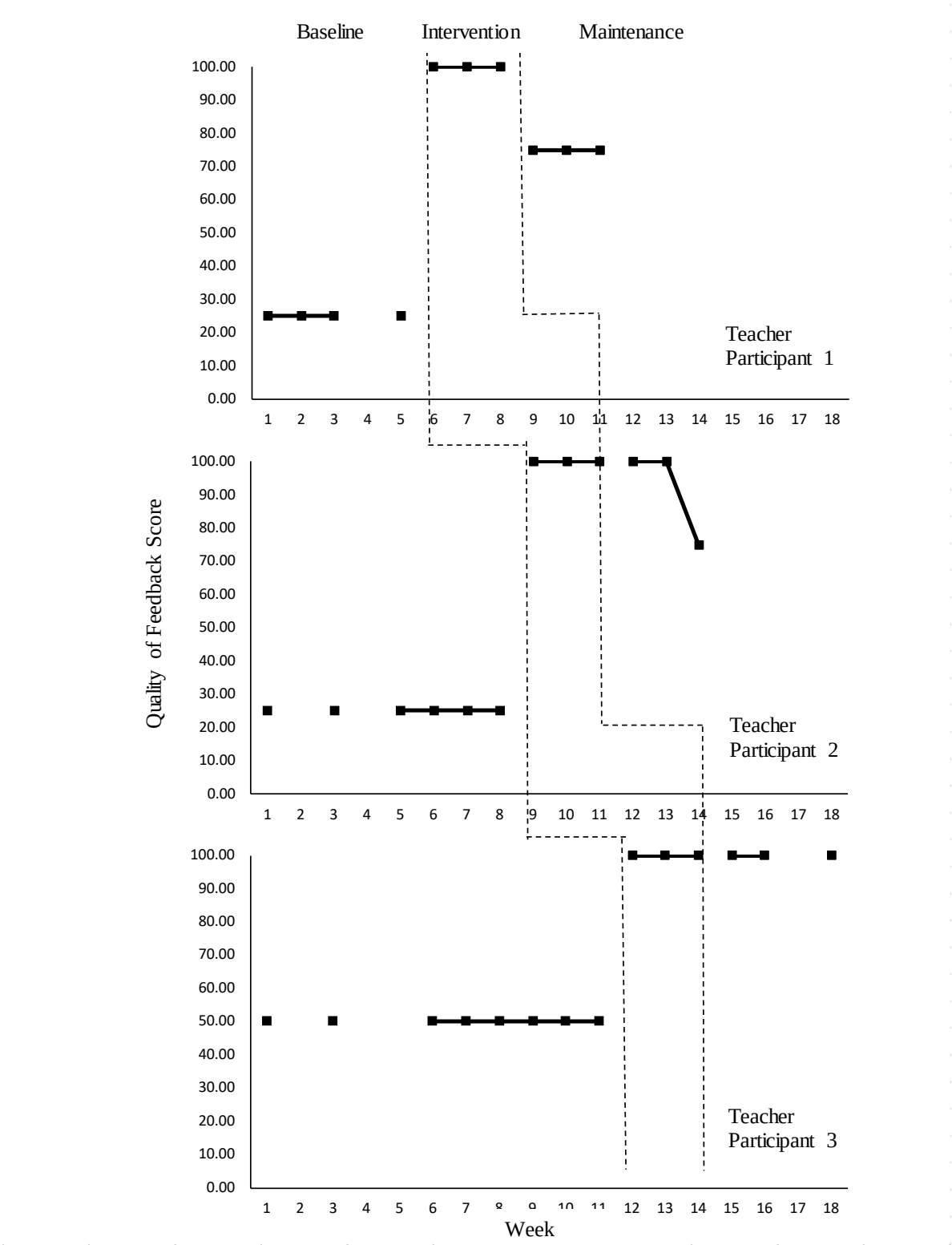


Figure 1. Teacher quality of feedback scores.

4.1.1 Teacher Participant 1

Throughout the baseline condition, Teacher Participant 1's scores on the Teacher Feedback Intervention Rubric were 25%. There was no variability in the baseline phase for Teacher Participant 1. Teacher Participant 1 was in the baseline phase for five weeks and had four data points. During Week 4, Teacher Participant 1 did not receive student assignments to grade due to a break in the school calendar, and therefore Teacher Participant 1 did not receive a score on the Teacher Feedback Intervention Rubric for that week. Teacher Participant 1 completed an additional week of baseline data due to school cancellations during the week intervention was scheduled to begin. The indicator that Teacher Participant 1 consistently completed was assigning a numerical grade to student work. Teacher Participant 1 did not provide any of the three other feedback indicators (feedback returned within two days, constructive suggestions to improve work, positive feedback on work).

During the intervention phase, Teacher Participant 1 was able to complete all indicators on the Teacher Feedback Rubric and received a score of 100% for three consecutive weeks. There was no variability during the intervention phase. Teacher Participant 1 moved to the maintenance phase after completing three weeks of intervention data at 100% on the Teacher Feedback Rubric.

During the maintenance phase, Teacher Participant 1's scores on the rubric decreased to 75%, as Teacher Participant 1 did not meet one indicator, returning work within two days, during the maintenance phase. Teacher 1 maintained 75% on the teacher feedback rubric for three data points, and the intervention concluded for Teacher Participant 1. The researcher administered a social validity survey to Teacher Participant 1 at the conclusion of the study, which Teacher Participant 1 returned within one day.

4.1.2 Teacher Participant 2

Throughout the baseline condition, Teacher Participant 2's scores on the Teacher Feedback Intervention Rubric were 25%. There was no variability in the baseline phase for Teacher Participant 2. During weeks 2 and 4 of baseline, the teacher did not receive student assignments to grade, and therefore Teacher Participant 2 did not receive a score on the Teacher Feedback Intervention Rubric for those weeks. Teacher Participant 2 was in the baseline for eight weeks and had six data points collected. The indicator that Teacher Participant 2 consistently completed was assigning a numerical grade to student work. Teacher Participant 2 was not providing any of the three other feedback indicators (feedback returned within two days, constructive suggestions to improve work, positive feedback on work). During the intervention phase, Teacher Participant 2 was able to complete all indicators on the Teacher Feedback Intervention Rubric and received a score of 100% for three consecutive weeks. There was no variability during the intervention phase. Teacher Participant 2 moved to maintenance phase after completing three weeks of intervention data at 100% on the Teacher Feedback Intervention Rubric. During the first two weeks of maintenance, Teacher Participant 2 earned a score of 100% on the rubric. In the third week of maintenance, Teacher Participant 2 earned a score of 75%. The teacher provided feedback within two days, with a numerical score, and provided positive feedback. The indicator that the teacher did not address was providing constructive criticism. However, Teacher Participant 2 met the procedures outline for maintenance phase, with three consecutive weeks at 75% or above and thus completed the intervention study. The researcher administered a social validity survey to Teacher Participant 2 at the conclusion of the study. The participant returned the social validity survey with two days.

4.1.3 Teacher Participant 3

Throughout the baseline condition, Teacher Participant 3's scores on the Teacher Feedback Intervention Rubric were 50%. There was no variability in the baseline for Teacher Participant 3. During weeks 2, 4 and 5 of baseline, the teacher did not receive student assignments to grade, and therefore Teacher Participant 3 did not receive a score on the Teacher Feedback Intervention Rubric for those weeks. Teacher Participant 3 was in the baseline for 11 weeks, and 8 data points were collected. The indicators that Teacher Participant 3 consistently completed were assigning a numerical grade to the student work and returning the work to the student within two days. Teacher Participant 3 did not providing two of the feedback indicators (constructive suggestions to improve work, positive feedback on work) during the baseline phase.

During the intervention phase, Teacher 3 was able to complete all indicators on the Teacher Feedback Rubric and received a score of 100% for three consecutive weeks.

During the maintenance phase, Teacher Participant 3 scored a 100% on the rubric on the rubric for two consecutive weeks. The third week of maintenance occurred during spring break at the school. Therefore, no data were collected by the researcher. During the fourth week of maintenance, Teacher Participant 3 scored a 100% on the rubric. The researcher administered a social validity survey to Teacher Participant 3 at the conclusion of the study. The participant returned the social validity survey within one day.

4.2 STUDENT ACTIVE ENGAGEMENT TIME

Figure 2 provides results for total weekly active engagement time (in minutes) for each student who participated in the courses the teacher participants monitored during an 18-week study, where intervention implementation occurred as a single case study across multiple baseline with three teacher participants.

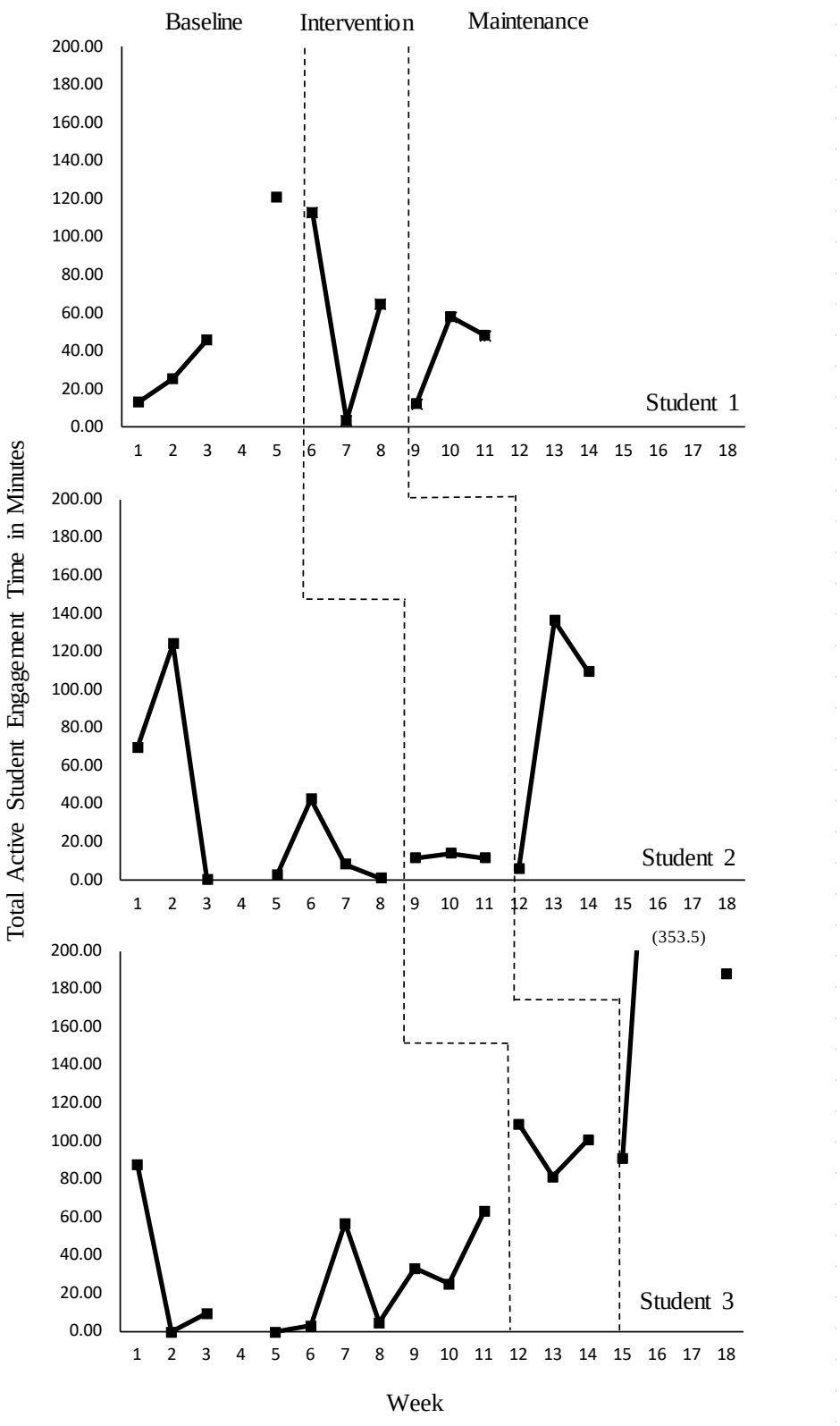


Figure 2. Student active engagement time.

4.2.1 Student Participant 1

Throughout the baseline condition for Student Participant 1, the trend of the total weekly minutes of active student engagement time data was increasing in trend. The first data point collected during baseline was 13.35 total weekly minutes of active engagement time, and this increased to 25.77 total weekly minutes for the second data point during Week 2 of baseline. In Week 3 of baseline, the total weekly minutes of active student engagement time increased to 45.66 minutes and continued to increase in Week 4 to 121. The mean amount of total weekly minutes of active student engagement time during baseline for Student Participant 1 was 51.50. The variability was 107.65 total weekly minutes of active student engagement time. It was highly variable, ranging from 13.35 total weekly minutes to 121 total weekly minutes of active student engagement time.

During the intervention phase of the study, data trended downwards, starting at 113.23 total weekly minutes of active student engagement time in Week 1 and decreasing to 3.28 minutes in Week 2. A potential factor that may have influenced Week 2 data of the intervention could be that the grading period had ended and the new grading period had just begun. During Week 3 the data trended upwards to 64.33 total weekly minutes of active student engagement time. During Intervention phase, the mean of the data was 60.28 total weekly minutes of active student engagement time, with a highly variable range of 3.28 total weekly minutes of active student engagement time to 113.32 total weekly minutes of active student engagement time.

During the maintenance phase, the data trended downwards from intervention to 12.13 total weekly minutes of active student engagement time during Week 1 of the maintenance phase. It then trended up to 58.41 total weekly minutes of active student engagement time during Week 2 of the maintenance phase. It then trended down slightly to 48.12 total weekly minutes of active student engagement time during Week 3 of the maintenance phase. During the

maintenance phase, the mean of the data was 39.55 total weekly minutes of active student engagement time, with a variable range of 12.13 total weekly minutes of active student engagement time to 58.41 total weekly minutes of active student engagement time.

4.2.2 Student Participant 2

During the first two weeks of the baseline condition, the trend of the student active engagement time (total minutes for the week) data was trending up. The first data point collected during baseline was 69.20 total weekly minutes of active student engagement time, and this increased to 124.13 total weekly minutes for the second data point during Week 2 of baseline. In Week 3 and 4 of baseline, the student did not have any active engagement time in the virtual education program. Potential factors could include the school break for winter and the student's vacation. During week 5 of baseline, the data point collected was 2.65 total weekly minutes of active student engagement time. The student's total weekly active engagement time increased to 42.55 total minutes in week 6. Then the data decreased in week 7 of baseline to 8.20 total minutes of active engagement time and continued to decrease in week 8 to 1.15 minutes of active engagement time in the course. The mean amount of weekly active engagement time during baseline for Student Participant 2 was 25.53 minutes weekly. The variability was 124.13 minutes. It was highly variable, ranging from 0 to 124.13 total weekly minutes of active student engagement time.

During the intervention phase, data trended up, starting at 11.59 total weekly minutes of active student engagement time in Week 1 and increasing to 13.70 total weekly minutes of active student engagement time in Week 2. During Week 3 the data trended down slightly to 11.07 total weekly minutes of active student engagement time. During Intervention phase, the mean of the

data was 12.12 total weekly minutes of active student engagement time, with a slightly variable range of 11.07 to 13.70 total weekly minutes of active student engagement time.

During the maintenance phase, the data trended down from intervention to 5.28 total weekly minutes of active student engagement time during Week 1 of the maintenance phase. It then trended up significantly to 136.45 total weekly minutes of active student engagement time during Week 2 of the maintenance phase. It then trended down slightly to 109.50 total weekly minutes during Week 3 of the maintenance phase. During the maintenance phase, the mean of the data was 83.74 total weekly minutes of active student engagement time, with a highly variable range of 5.28 minutes to 136.45 total weekly minutes of active student engagement time.

4.2.3 Student Participant 3

Student Participant 3 was in the baseline condition for the longest duration. During the first two weeks of the baseline condition, the student active engagement time (total minutes for the week) data trended down. The first data point collected during baseline was 87.77 total weekly minutes of active student engagement time, and this decreased to 0 total weekly minutes of active student engagement time for the second data point during Week 2 of baseline. In Week 3 of baseline, the active engagement time increased to 9.60 total weekly minutes of active student engagement time. The researcher did not collect data during Week 4 of baseline due to the winter break in the school calendar. For Week 5 of baseline, the student did not engage in the program and had a total of 0 total weekly minutes of active engagement time. In Week 6 of baseline, this increased slightly to 3.20 total weekly minutes of active student engagement time. The data then trended up to 57.22 total weekly minutes of active student engagement time in Week 7 then trended

down to 4.31 minutes in Week 8. The data trended back up in Week 9 with 33.15 total weekly minutes of active student engagement time, then trended down slightly in Week 10 to 24.72 minutes of active student engagement time. The data then trended up in the final week of baseline (Week 11) to 63.42 minutes of active student engagement time. The mean amount of weekly active engagement time during baseline for Student Participant 3 was 73.42 total weekly minutes of active student engagement time. The variability was 87.77 total weekly minutes of active student engagement time. It was highly variable, ranging from 0 total weekly minutes to 87.77 total weekly minutes of active student engagement time.

During the intervention phase, data trended up, starting at 109.50 total weekly minutes of active student engagement time in Week 1 of Intervention phase and decreasing to 80.98 total weekly minutes of active student engagement time in Week 2 of intervention. During Week 3 of the intervention phase, the data trended up to 100.75 total weekly minutes of active student engagement time. During intervention phase, the mean of the data was 97.08 total weekly minutes of active student engagement time, with a variable range of 80.98 total weekly minutes to 109.50 total weekly minutes of active student engagement time.

During the maintenance phase, the data trended down for Student Participant 3, from 100.75 total weekly minutes of active student engagement time during Week 3 of intervention phase to 91.00 total weekly minutes of active student engagement time during Week 1 of the maintenance phase. It then trended up significantly to 353.50 total weekly minutes of active student engagement time during Week 2 of the maintenance phase. This dramatic increase in Week 2 of maintenance phase could be due to the grading period closing during this week. The researcher did not collect data during Week 3 of maintenance phase due to the spring break in the school calendar. It then trended down to 119.47 total weekly minutes of active student

engagement time during Week 4 of the maintenance phase. During the maintenance phase, the mean of the data was 187.99, with a highly variable range of 91.00 to 353.50 total weekly minutes.

4.3 SOCIAL VALIDITY RESULTS

Table 5

Social Validity Results

Item	Domain	Teacher 1	Teacher 2	Teacher 3	Mean
1	This was an acceptable intervention for the virtual education program.	5	6	5	5.33
2	I found this intervention to be appropriate.	5	6	6	5.67
3	This intervention was effective in meeting the purposes.	5	5	5	5.00
4	I would suggest the use of this intervention to other teachers.	5	5	4	4.67
5	The intervention was appropriate to meet the school's needs and mission.	5	6	4	5.00
6	This intervention was a reasonable way to meet the stated purposes.	5	6	5	5.33
7	This intervention was a reasonable way to meet the stated purposes.	5	6	5	5.33
8	I liked the procedures used in this intervention.	5	5	4	4.67
9	This intervention plan was a good way to meet the specified purposes.	5	5	4	4.67
10	The procedures were manageable.	5	6	4	5.00
Mean		5.00	5.60	4.60	5.07

Note. 1= Strongly Disagree, 2= Disagree, 3= Slightly Disagree, 4= Slightly Agree, 5= Agree, 6= Strongly Agree

The researcher conducted a social validity survey with both special education teachers who participated in the study. The social validity survey (Appendix B) was comprised of six questions with respondents answering on a Likert scale between 1 and 6, with 1 indicating “I strongly disagree” and 6 indicating “I strongly agree.” Overall, all participants agreed with all of the statements on the social validity assessment, with responses ranging from slight to strong agreement. Teacher Participant 2 had the highest overall rating of social validity with an overall average of 5.6. Teacher Participant 1 had an overall average of 5.0, indicating agreement. Teacher Participant 3 had an overall average of 4.6, with higher ratings in the effectiveness of the intervention and lower ratings in ease of use, although all ratings indicated agreement on varying levels. Anecdotally, Teacher Participant 3 indicated that the rubric was very helpful to not only improve feedback but to keep track of students on a more individualized level to see if the student was engaged in the course or not completing work. All teachers rated the feedback intervention as having social validity and useful for improving the quality of feedback provided in the virtual education setting to students.

5.0 DISCUSSION

With the increasing number of students with disabilities enrolling in virtual education programs (Carnahan & Fulton, 2013, Shellie & Lindsay, 2006), some unique benefits and challenges emerge for students with disabilities. Significant benefits include the ease of providing individualized instruction in virtual education, the removal of physical barriers and time constraints, and the use of multimedia technologies to facilitate different learning styles and needs (Vasquez & Straub, 2012). However, a significant disadvantage for students with disabilities in the virtual education setting is the inherent separation of teacher and learner and the impacts this separation could potentially have on the learner (Keegan, 1996). Additionally, certain types of educational software used in virtual education programs could potentially further limit teacher and learner interactions and prevent authentic learning and communication between the teacher and the learner (Oliver, Herrington, Herrington & Reeves, 2007).

Teacher-learner interaction in the virtual education setting has been found to be an element that can promote student success in the virtual education environment (Jonassen et al., 2008). Teachers have a limited opportunity in the virtual education environment to communicate with and instruct students. Nevertheless, a way teachers can impact students is by providing frequent and meaningful feedback to students working in the virtual education program (Moore, 2007). There is a need for further research on how teacher-learner communications and interactions impact student success for students with disabilities in the virtual education setting

since it is imperative under IDEA for students to make progress in their educational settings through the use of targeted, evidence-based instruction and interventions. This chapter's discussion examines the varied effects of a teacher feedback intervention and the impact of this intervention on the active engagement time of students with disabilities in a virtual education setting.

5.1 INQUIRY QUESTIONS

The study attempted to add to the virtual education literature base by employing a single-subject research design across multiple baselines. Specifically, the purpose of the study was to answer the following research questions:

1.) What are the effects of implementing a teacher feedback intervention on the quality of feedback provided by teachers in the virtual education program?

2.) What are the effects of implementing a teacher feedback intervention on the active engagement time of students with disabilities in the virtual education program?

3.) What is the social validity of implementing a feedback intervention for teachers that work with students with disabilities in the virtual education environment?

5.1.1 Inquiry Question 1

The study sought to examine the effects of implementing a teacher feedback intervention on the quality of feedback provided by teachers in the virtual education program at the study site setting. It was clear throughout the baseline phase for all teacher participants that feedback was

not meeting all the indicators of quality feedback and focus mainly on providing a numerical score for a grade, rather than constructive feedback and positive comments on student work. Teacher Participant 1 and Teacher Participant 2 were only meeting the numerical grade indicator during baseline phase. Teacher 3 was meeting the numerical grade indicator and returning work within two days during baseline phase. There were no specific protocols for grading in place for the virtual education program before the intervention, so the data collected during baseline phase was indicative of natural teacher behavior.

The use of a feedback rubric during intervention phase and the related training led all three teacher participants to make a change in their grading procedures to meet all four indicators on the rubric (Appendix A). The teachers consistently were able to implement the intervention procedures through the use of the rubric during the intervention phase. This change in teacher behavior indicates that there was a functional relationship between improving quality of teacher feedback and the intervention procedures. Teacher behavior changed as a function of the intervention as evidenced by the consistent and stable increase in rubric scores during the intervention phase. The quality of feedback improved when and only when the intervention was implemented with teachers.

During the maintenance phase, the effect of the intervention varied for each teacher participant. Teacher Participant 1 was able to continue to increase the quality of feedback from baseline phase. However, there was a small decrease in the quality of feedback for Teacher 1 from intervention to the maintenance phase. The decrease was due to the teacher being unable to implement the indicator on the rubric that student work was returned within two days. Anecdotally, Teacher Participant 1 indicated to the researcher that it was difficult to implement this indicator as this participant had offered to help a colleague teach a class, and their schedule

had become more demanding. This indicator may have been difficult for this study's participants to complete, as their position in the virtual education program is an additional position and all teachers are still teaching full-time during the work week in the brick-and-mortar classrooms. Teacher Participant 2 was able to consistently demonstrate mastery of the rubric during the maintenance phase, except the last week of maintenance when Teacher Participant 2 did not provide constructive feedback on the assignment to the student. Teacher Participant 3 did not have any changes in behavior between intervention phase and maintenance phase and met all indicators on the feedback intervention rubric. The intervention improved the quality of feedback provided by teachers in the study, as indicated in the positive change in behaviors of participants across multiple baselines.

5.1.2 Inquiry Question 2

The study sought to examine the effects of implementing a teacher feedback intervention on the active engagement time of students with disabilities in the virtual education program. The study did not have sufficient evidence of a functional relationship existing between increasing the quality of teacher feedback and student active engagement time. The data collected during maintenance, intervention, and baseline was highly variable and did not change in a consistent pattern when the intervention was implemented with the teachers providing a higher quality of feedback. While the intervention did improve the quality of teacher feedback, it did not translate into an immediate impact on student performance. The absence of a functional relationship between the teacher feedback intervention and an increase in active student engagement time could be due to the function that teacher-learner engagement in virtual education programs is only one factor that impacts student engagement and success.

One potential variable that could have impacted the student active engagement time was the timing of the intervention in relation to the timing of the nine-week grading period. The grading period was scheduled to end during the middle of week 7, and all student work was due at this time. During Week 6, the week before the end of nine-week grading period, the student active engagement time increased or stayed consistent for Student Participant 1 and Student Participant 2. Student Participant 1's active engagement time stayed relatively consistent with a total time of 121.00 minutes of active engagement time in Week 5 and 113.13 minutes of active engagement time in Week 6. However, there was an immediate drop in active engagement time to 3.28 minutes for Student Participant 1 in Week 7. This dramatic decrease in engagement time could be due to the fact that Student Participant 1 had completed the majority of his work during Weeks 5 and 6 of the study to ensure he completed any missing work before the nine-week grading period closed and he received his grade. Student Participant 2 saw an increase in total active engagement time in Week 6, increasing his total time from 2.65 minutes of active engagement in Week 5 to 45.55 minutes of active engagement time in Week 6. Similar to Student Participant 1, Student Participant 2's total amount of active engagement time dropped dramatically to 8.20 minutes of active engagement time in Week 7, which could also be attributed to the fact that at that point in time Student Participant 2 had finished the majority of his coursework for the nine weeks.

Student Participant 3 had very low weekly active engagement time during the majority of the nine-week grading period that occurred during his baseline data phase, with an outlier during Week 1 of baseline (87.77, 0, 9.6, 0, 3.2). Student Participant 3 had a dramatic increase in total weekly active engagement time during Week 7 of the intervention study, which was the week that grades officially closed for the students. During Week 7, Student Participant 3 increased

from 3.20 total weekly minutes of active engagement time (Week 6) to 57.22 minutes of active student engagement time in Week 7. After the nine weeks had closed (Week 7) and the new nine weeks grading period had begun (Week 8), Student Participant 3 dropped down dramatically in total weekly active student engagement time to 4.31 total minutes. Since the study spanned over 18 weeks of the school year, there was an additional point in the study where grades were due for the nine weeks and Student Participant 3's active engagement times increased potentially as a result of the end of the nine weeks. At this point in the study, data had been collected and finalized for Student Participant 1 and Student Participant 2 and was no longer being monitored by the researcher. During Week 17 of the intervention study, Student Participant 3 increased his total weekly active engagement time dramatically to a record high of 353.50 total minutes of active student engagement time, which increased from 91.00 total minutes of active engagement time in Week 16. Among all participants, the end of the nine-week grading periods did correlate with spikes in the data trends. Overall, a direct functional relationship between the teacher intervention and student active engagement time cannot be directly established. However, it is significant to note that for Student Participant 3, total weekly active student engagement data points during the intervention phase and maintenance phase were significantly higher than the data collected during baseline, except the outlier in Week 1 of the study.

5.1.3 Inquiry Question 3

The study sought to examine the social validity of implementing a feedback intervention for teachers that work with students with disabilities in the virtual education environment. Results from the social validity survey indicated that the intervention had a high level of social validity among all three participants, as indicated in Table 4. Teacher Participant 1 had an overall

average score of 5.0 on the social validity survey, indicating strong agreement with all assessed items. Teacher Participant 2 had an overall average score of 5.6 on the social validity survey, indicating strong agreement with all assessed items with some items having a very strong agreement. Teacher Participant 3 had an overall average score of 4.6 on the social validity survey, indicating agreement with all assessed items.

One potential variable that could have influenced this high level of social validity is that participants had not had previous training on how to provide meaningful, quality feedback to students in the virtual education program. In the literature, there is a noted lack of training provided to pre-service teachers on how to engage with students in the virtual education environment (Kennedy & Archambault 2012). Teachers have also noted a sense of isolation that exists when teaching in a virtual environment between administration, other teachers, and students (Hawkins et al., 2012). Interventions to address this isolation experience for teachers and provide teachers skills to facilitate teacher communication and feedback with students should always be examined for social validity to ensure that professional development is meaningful and productive for teachers.

5.2 CONNECTIONS TO RESEARCH

While the research field is still growing for virtual education, one factor that has been examined that could promote student success in a virtual education program is the presence of teacher support (Easton, 2003). Since the environment is isolated naturally due to the physical separation of the teacher and learner (Keegan, 1996), it is imperative that the communication practices of the teachers in virtual education program establish a foundation for engaging and motivating

students' interaction with the course content. The student should understand that while the teacher may not be physically present, that teacher is there to support, monitor, and provide feedback to the student, just as the teacher would in a traditional brick-and-mortar setting. One way that teachers can make their presence known to students in their course is to reply to student responses on the discussion boards, provide quick feedback on assignments, and be responsive to the students' questions and concerns (Woo & Reeves, 2007).

Since increasing teacher presence in student courses has been found to impact learning outcomes, the current study sought to improve presence by improving the quality of feedback. Although Johnson & Pitcock (2007) highlight the importance of a teacher actively monitoring students' understanding of the content to identify gaps in their knowledge and provide support, when there was an increase in the quality of feedback provided in this study, there was no functional relationship to student performance. This lack of a direct functional relationship in improving active student engagement time when the quality of feedback increased could be due to many competing factors that could not be controlled for in this study. However, as noted in the student results, students were completing their coursework by the end of the nine weeks. Hawkins et al. (2013) support that with an increase in the quality and frequency of teacher interaction there is an increased probability of course completion.

5.3 LIMITATIONS

There are several limitations in the study. The first limitation resulted from the design of the study. The design of the study, a single case study design across multiple baselines, has a low number of participants, which therefore limits external validity and generalizability to other

settings and participants. The participants in the present study were not similar in demographic variables, which could not be controlled for in the setting, due to a limited sample pool. Additionally, the present study did not have inter-observer agreement on the scoring of the teacher feedback rubrics in the design, which potentially could have strengthened the reliability of the study. The study also did not include treatment integrity data in the design, and as a result, a second observer could not adequately verify that the teacher feedback intervention was implemented with 100% accuracy. Additionally, the intervention was introduced mid-school year but could have potentially been more effective for student participants had it been implemented earlier in the school year.

A final limitation of the study included the limitations of the educational software utilized for the virtual education program at the site setting. The capabilities for communication and feedback in the educational software is unique to the software, and while other programs may offer similar features for teachers to provide feedback and communicate with students, educational software is not identical across different virtual education programs and therefore cannot be generalized. Additionally, not all educational software utilized in virtual education programs has the same capabilities to track active student engagement time as the program utilized in the site setting, and protocols for collecting these data may vary slightly between educational software that is utilized in other virtual education programs.

5.4 IMPLICATIONS FOR RESEARCH

Research on virtual education is a developing field, yet there are limited quantitative studies on evidence-based practices that teachers can employ in the virtual education environment (Bernard,

Abrami, Lou, & Borokhovski, 2004; Cavanaugh, Barbour, & Clark, 2009). Due to the nature of the virtual education environment and the varying models of virtual education, it is difficult for quantitative studies to be considered generalizable across environments. Different virtual education environments have different curriculums, learning management systems, and requirements that teachers must learn to navigate without pre-service training in these unique and often isolating environments due to the separation of the student and teacher (Hawkins et al. 2012). As the numbers of students enrolling in virtual education programs continue to rise each year (Gander, 2015), so too must research into effective evidence-based practices for teachers.

In this study, a teacher feedback intervention was used to train teachers in the indicators of quality feedback and provide tools, such as the feedback checklist and rubric, for teachers to utilize to improve communication and feedback provided in the virtual environment. To date, this study appears to be the only study that has sought to examine the effects of a teacher feedback intervention on both teacher behaviors when providing feedback to students and the quality of teacher feedback on active student engagement time. Given the limited generalizability of this study, further investigation is required to study or replicate the results of this study. Future research studies could examine the impact of improving the quality of feedback provided in virtual environments by soliciting the students' perceptions of the feedback provided by teachers and analyzing and applying the feedback from students to guide future improvements to the feedback intervention, rubric, and checklist.

5.5 IMPLICATIONS FOR PRACTICE

When examining the simplicity of implementation of the feedback intervention rubric, the positive changes in quality of feedback provided both in intervention phase and maintenance phase, and the high social validity of the intervention, researchers should consider the dissemination of the teacher feedback rubric and intervention as a professional development and training tool for virtual education programs. The Teacher Feedback Intervention Rubric was an intervention that could be easily implemented with teacher participants across multiple baselines and would be an ideal professional development for teachers in virtual education settings because it is simple, yet still provides a concrete model and checklist for providing feedback in the virtual education environment, which is unique due to the separation of the teacher and student (Keegan, 1996).

Nonetheless, questions still exist regarding the generalization of the intervention in different virtual education software systems and if all virtual education software would allow for the same level of teacher-learner interaction that existed in this study site. Since the study was completed with a small number of participants at only one setting, there are still gaps in the literature for the effectiveness of teacher feedback interventions in different settings and participants, and the results cannot be generalized to the broader field. Regardless of the education setting, it is still considered a best practice for teachers to provide quality feedback to students that is timely, quantifiable, constructive, and positive (Segal, Chipman, & Glaser, 2014). Therefore, the next steps for practitioners would be to include the continuation of professional development in virtual education environments to enhance the quality of feedback provided by teachers to students. It is imperative for administration in virtual education settings to consider the lack of pre-service training regarding virtual education settings for teachers (Kennedy &

Archambault 2012) and seek to implement professional development that will educate teachers on translating the evidence-based practices that occur in the brick-and-mortar classroom into the virtual classroom.

5.6 CONCLUSION

As technology continues to advance the educational field into uncharted territories, opportunities emerge for teachers to engage with students in new educational environments, such as virtual education programs. Teachers need to be prepared to engage with students in these environments because they play a key role in student success and must be given the tools to utilize evidence-based practices to promote student success. The present study examined the use of a feedback intervention for teachers in a virtual education setting to improve student active engagement in the teacher's course. A functional relationship existed between the use of the intervention and the positive increase in quality of teacher feedback. A functional relationship did not exist between increasing the quality of teacher feedback and active student engagement time. It is important to note that the study could not control for outside factors, such as the timing of the intervention in relation to the end of the grading period, which could have had an impact on the active engagement time of students. Overall, the intervention had a high level of social validity among participants and was found to be an effective tool to begin to address teacher-learner communication needs and feedback in the future.

Although the data in this study did not indicate that there was an immediate impact on active student engagement time increasing in the virtual education environment, providing quality feedback is still considered a best practice for teachers, and there is an extensive literature

base to support this practice (Segal, Chipman, & Glaser, 2014). In the virtual education field, it is imperative that researchers continue to study interventions that contribute to the teacher's ability to use evidence-based practices with all students, and rigorous, repeated studies of these interventions should occur across virtual education environments to ensure that teachers are providing the highest quality of instruction and engagement for the most critical stakeholder in virtual education programs, the students.

APPENDIX A

TEACHER FEEDBACK INTERVENTION RUBRIC

Teacher Feedback Rubric for Intervention Use

Indicators of Quality Feedback

- Feedback is delivered within 2 days of student work submission
- Feedback includes a numerical grade
- Feedback includes constructive suggestions to improve the student's work
- Feedback includes a positive comment on student's work

Ideal Feedback Score= 4 Indicators are Present

Rubric

Quality of Feedback	Indicators Present
4	**4**
3	**3**
2	**2**
1	**1**

Checklist for Quality Feedback

_____Feedback was delivered within 2 days

Date of assignment submitted _____

Date assignment was graded _____

_____Feedback includes a numerical grade

_____ Feedback includes constructive suggestions to improve the student's work

_____ Feedback includes a positive comment on the student's work

Number of indicators present _____

Rubric Score _____

APPENDIX B

SOCIAL VALIDITY SURVEY

Participant: _____ Date: _____

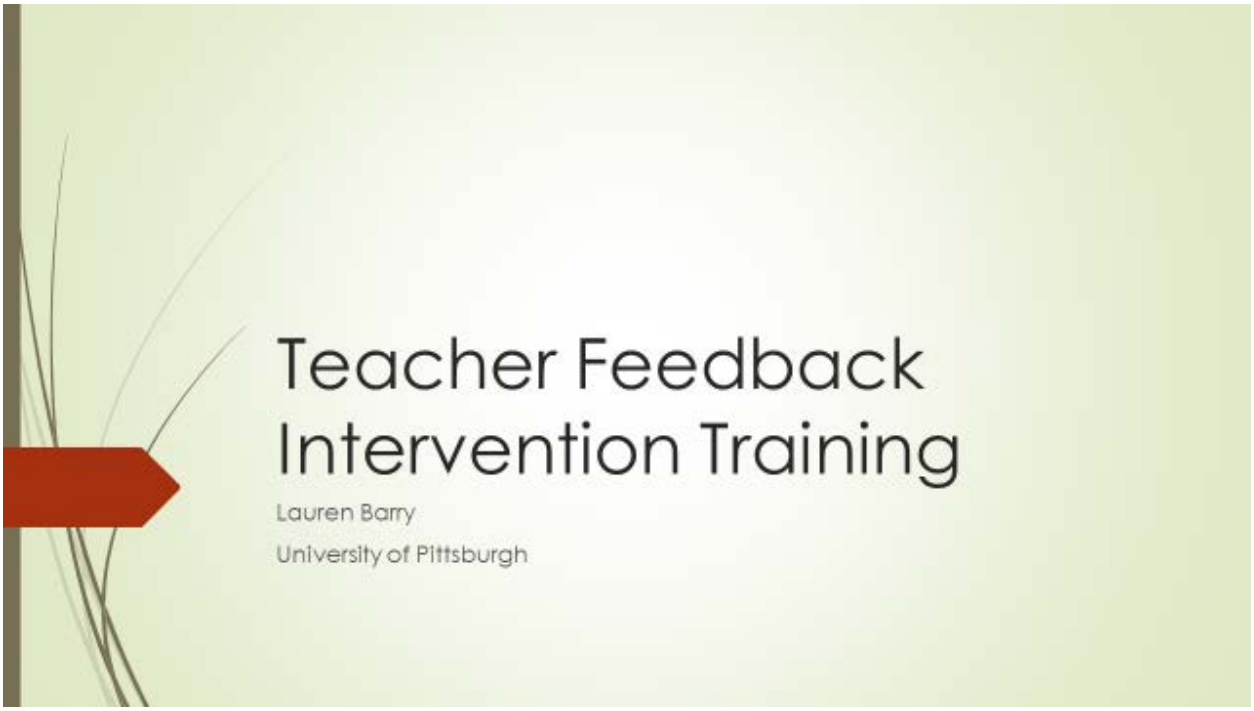
Now that you have completed the teacher feedback intervention, please complete this survey to obtain information that will help to determine the effectiveness and usefulness of the feedback intervention components for the virtual education program. Please read the following statements regarding the feedback intervention developed by the researcher and circle the number that best describes your agreement or disagreement with each statement.

	Strongly Disagree	*Disagree*	*Slightly Disagree*	*Slightly Agree*	*Agree*	*Strongly Agree*
1. This was an acceptable intervention for the virtual education program.	1	2	3	4	5	6
2. I found this intervention to be appropriate.	1	2	3	4	5	6
3. This intervention was effective in meeting the purposes.	1	2	3	4	5	6
4. I would suggest the use of this intervention to other teachers.	1	2	3	4	5	6
5. The intervention was appropriate to meet the school's needs and mission.	1	2	3	4	5	6
6. I found this intervention suitable for the described purposes and mission.	1	2	3	4	5	6
7. This intervention was a reasonable way to meet the stated purposes.	1	2	3	4	5	6
8. I liked the procedures used in this intervention.	1	2	3	4	5	6
9. This intervention plan was a good way to						

meet the specified purposes.	1	2	3	4	5	6
10. The procedures were manageable.	1	2	3	4	5	6

APPENDIX C

TEACHER FEEDBACK INTERVENTION TRAINING: DEMONSTRATION OF SCHOLARLY PRACTICE



Why is teacher feedback important in an online environment important?

- The assessment process involves an interactive feedback loop: students provide feedback via the assessment and teachers provide feedback on learning progress to the students. This cycle enhances the students' content knowledge and skills as well as provides teachers valuable insight into instructional methods (Thille et al. 2014).
- A study completed with 2,269 students in a Utah Virtual High School addressed teacher interaction by studying three types of interaction: feedback interaction, procedural interaction, and social interaction. The regression of these variables indicates that an increase in the quality and frequency of interaction resulted in an increased likelihood of course completion (Hawkins et al., 2013).

What are the four indicators of quality feedback?

- **Feedback is timely**
  - Koedinger, Anderson, Hadley, and Mark (1997) assert that immediate feedback is a critical aspect in supporting individualized instruction and student motivation.
- **Feedback is quantitative and objective**
  - Feedback should be realistic and should include a quantitative score related to the assignment. Having clear criteria or guidelines provided to students before the assignment creates transparency and gives an understanding of the expectations required (Segal, Chipman, & Glaser, 2014).
- **Feedback provides positive reinforcement**
  - Feedback should be positive to promote student growth (Segal, Chipman, & Glaser, 2014).
- **Feedback provides constructive criticism**
  - Providing robust feedback that targeted students' conceptual misunderstandings - where feedback consisted of highlighting potential errors in student essays in addition to providing them resources conceptually related to identified errors - promoted meaningful metacognitive processing (Segal, Chipman, & Glaser, 2014).

Teacher Feedback Intervention Checklist

Checklist for Quality Feedback

- _____Feedback was delivered within 2 days
  - Date of assignment submitted _____
  - Date assignment was graded _____
- _____Feedback includes a numerical grade
- _____Feedback includes constructive suggestions to improve the student's work
- _____Feedback includes a positive comment on the student's work

- Number of indicators present _____
- Rubric Score _____

Teacher Feedback Intervention Rubric

Teacher Feedback Rubric for Intervention Use

Indicators of Quality Feedback

- Feedback is delivered within 2 days of student work submission
- Feedback includes a numerical grade
- Feedback includes constructive suggestions to improve the student's work
- Feedback includes a positive comment on student's work

Ideal Feedback Score= 4 Indicators are Present

Rubric

Quality of Feedback	Indicators Present
4	4
3	3
2	2
1	1

Application of the Teacher Feedback Intervention Checklist

- You will now be provided with three samples of student work.
- Please use the teacher feedback intervention checklist to grade these assignments. When you are finished, please show the trainer your samples for feedback. You must earn a score of 4 on the Teacher Feedback Intervention Rubric on at least three samples of student work in order to complete this training module.

Review Questions

- What are the four indicators of quality feedback?
- Why is quality feedback important in the virtual environment?
- What steps must you take to utilize the teacher feedback intervention checklist to fidelity?

Next Steps

- You will now be expected to utilize the teacher feedback intervention checklist as you provide feedback to your students in the virtual environment.
- There will be weekly check-in meetings with the trainer to ensure the intervention checklist is used to fidelity. Your average scores on the intervention checklist rubric will be shared with you at these meetings.
- Weekly check in meetings will be 5-10 minutes depending upon your weekly scores and potential questions.
- Once you have demonstrated 3 consecutive weeks of using the checklist and earning a score of 4 or 100% on the checklist, meetings will be scheduled on a bi-weekly basis.

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