Professional Development in the Area of Autism:

Effectiveness of Collaboration in Online and Face-to-Face Learning Formats

by

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ABSTRACT

Effectively educating students with autism is a necessary element in providing all students with a free and appropriate public education, and as the number of students diagnosed with an autism spectrum disorder continues to increase in both public and private educational settings, providing successful and satisfactory professional development opportunities in the area of autism is becoming increasingly essential. This study explored the experiences of twenty-three educators in a suburban southwest K-12 public school district, as they participated in a fifteen-hour professional development course in an online or face-to-face format, and collaboratively problem-solved their challenges in educating students with autism. Qualitative data was collected from participants' weekly written reflections and comments from a pre- and post-survey on attitudes, to determine quality of and satisfaction with collaboration in relation to course format. Results indicated that the online format produced higher-quality collaboration when it came to presenting one's own situation(s) to the group, finding group discussions helpful, having enough time to collaborate, providing feedback/suggestions to group members, and perceiving suggestions for one's own situation as helpful (as evidenced by the number of suggestions that participants said they would likely implement). The face-to-face format produced higher-quality collaboration when it came to in-depth problem-solving regarding a situation, implementing suggestions for one's own situation, and relating course content to collaborative activities. Participants' attitudes about using technology as a means of collaboration showed little change overall from pre- to post-survey.

Though slight increases in positive attitudes concerning technology were found in various areas, many participants still thought highly of a face-to-face format for collaborative purposes, even after participating in the online professional development course. Findings may be of use to educational institutions developing online or face-to-face professional development opportunities in the area of autism.

DEDICATION

First and foremost, I would like to thank God for blessing me with the opportunity

and drive to pursue my doctoral degree. I dedicate this dissertation to my

incredible family, who has shown continuous support and encouragement for my

schooling from the moment I stepped into pre-school. Dad, Mom, Nicole,

Grandpa and Grandma, you have shaped me into the person I am today and have

been there through it all, supporting me, cheering me on, and providing a

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1

INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurobiological developmental

disorder beginning at birth or early in development, characterized by deficits in

communication and social interaction, and often accompanied by restricted and

repetitive behaviors, though behaviors can vary greatly from individual to

individual (Autism Speaks, 2005 – 2011; National Research Council, 2001).

Recent reports suggest that 1 in 110 children have autism, and 1 in 70 boys, and

diagnoses continue to increase (Autism Speaks, 2005 – 2011).   As diagnoses

increase, schools are seeing a rise in the number of students with autism that they

are servicing. Currently, the primary form of treatment for individuals with

autism is education, including the education of parents and teachers (National

Research Council, 2001). Education in the area of autism can present many

challenges, as the individualized nature of each diagnosis makes it difficult to

conceive of a blanket approach to treatment and intervention. Additionally, the

increased importance of autism education in teacher preparation programs and as

a part of ongoing education for teachers in the form of professional development

has only recently become a major priority as the number of students with autism

increases. This also presents a challenge, as educators are now finding that they

have to quickly and efficiently learn how to work with their students with autism,

as they may not have been previously adequately prepared.

One of the most widely-used forms of ongoing education for in-service

teachers and other educators is professional development. The most effective

professional development may be that which allows educators to directly apply newly gained knowledge to their specific students and situations, and with relative immediacy. How best to implement professional development so that it is most effective for its audience is an area that continues to be studied in almost all professional settings.

The purpose of this research study was to investigate the perceived experience of a group of educators as they participated in a professional development course in the area of autism in either an online or face-to-face format. The study focused on the quality of collaboration amongst participants as evidenced by the written reflections of the educators in relation to the effectiveness of collaborative problem-solving efforts within the group. Also explored were possible changes in the educators' attitudes toward technology as a means of collaboration, as a result of either participating in the online or face-to-face formats of the course.

Findings from this study provide information regarding the quality of collaborative problem-solving in online and face-to-face formats, for challenges faced in educating students with autism. Additionally, the findings provide insight into the attitudes of participants regarding the effectiveness of collaboration in either format. Results may contribute to the knowledge base of educational systems and their efforts to create effective and efficient professional development activities in the area of autism.

Chapter 1 describes the study's background, a statement of the problem that the study addresses, context of the study and professional significance. Also provided is an overview of the methodology used to collect and analyze data as well as limitations of the study, and definitions for key terms that will be used throughout the dissertation.

Background of the Study

Mandates in The No Child Left Behind Act require that all students reach certain academic standards regardless of ability or other outside factors (NCLB, 2002). One of the most challenging tasks faced by teachers today is successfully complying with these mandates by meeting the needs of a very diverse group of students, including those with special needs (Jenkins & Yoshimura, 2010). General and special education teachers alike may be under qualified in meeting the diverse needs of the students they service, especially students with behavior problems, including those that may be brought about by an autism spectrum disorder (Frey, 2009; Kraemer, Cook, Browning-Wright, Mayer, & Wallace, 2008). Even if teachers are certified in special education, most still receive little to no formal training in evidence-based practices for working with children with autism, though the need for teachers with strong skills and knowledge in the education of children with autism is becoming ever more essential due to increases in diagnoses (McCabe, 2008; National Research Council, 2001).

Current training for teachers who work with students with special needs including autism, may be lacking in quantity and quality, contributing to low teacher retention, high burnout rates (Hastings & Brown, 2002), and ineffective outcomes for students.

Vo and Nguyen (2009) propose that both pre-service and in-service level reform is needed in teacher education. For in-service teachers, professional development opportunities may be the most efficient means of providing training where gaps in knowledge exist. Current research shows a strong link between professional development, student achievement and school reform, but lack of relevant content and applicability may make professional development opportunities less than effective (Kesson & Henderson, 2010; Guskey, 2002). School districts must demonstrate the effectiveness of professional development opportunities (Ebert & Crippen, 2010), researching and employing a variety of methodologies to determine the most successful.

In the field of education, requirements for accountability and the subsequent need for professional development continue to increase while budgets are being cut, resulting in a need and desire to incorporate technology into professional development opportunities (Dillon, Dworkin, Gengler & Olson, 2008). School district resources, or lack thereof, play a major role in the types of professional development opportunities offered. One resource that is fast becoming a mainstay in many school districts around the country is technology as a means of instruction and collaboration. Accessibility, affordability and flexibility make online instructional opportunities appealing to many (Dillon,

Dworkin, Gengler & Olson, 2008). However, mixed results of the effectiveness

of technology in addition to general methods of instruction in professional

development generate a need for further research (Dillon, Dworkin, Gengler &

Olson, 2008; Donovant, 2009; Frey, 2009; Hauck, 2006; Heale, Gorham &

Fournier, 2010; Koroghlanian & Brinkerhoff, 2007; Lim, Kim, Chen & Ryder,

2008; Pucell & Stertz, 2005; Rovai, Wighting & Lie, 2005; Yuen & Ma, 2008).

Problem Statement

As the number of children diagnosed with autism increases, more students

are coming to school with a diagnosis that requires educational intervention

and/or issues that affect their ability to successfully participate in a typical

classroom setting. Educators need to know how to successfully work with these

students, so that they may receive the most successful free and appropriate

education possible as required by the Individuals with Disabilities Educational

Improvement Act of 2004 (IDEA 2004). If schools and school districts wish to

provide all students with the most successful education possible, devising the

most effective professional development methods for educating professionals who

work with students with autism is a necessary endeavor.

Professional development in the area of autism can be offered in many

forms including, but not limited to, action research, case discussions, coaching,

curriculum development, journaling and reflective logs, mentoring, networking,

portfolio production, study groups, and the 'train-the-trainers' method (Lang &

Fox, 2004), and can be offered in face-to-face, online, or hybrid formats

(Koroghlanian & Brinkerhoff, 2007). The wide variety of opportunities available

raises the question, "What is the most effective way to conduct professional development in the area of autism?" To meet the needs of students and the professionals who work with them, professional development strategies in the area of autism must be identified and evaluated for success, including specific factors that may increase or decrease effectiveness.

Professional Significance

Many educators consider professional development to be fragmented, disconnected, and irrelevant to the problems they face in their classroom (Lieberman & Pointer Mace, 2010). Developing professional development opportunities that are personally satisfying and applicable to educators and their classroom situations may help educators to feel a sense of accomplishment, job satisfaction and control over their environment, in turn creating a more positive school and district climate overall. This may be especially true when devising professional development opportunities to assist educators in working with students with autism, which has the potential to be one of the most challenging situations faced by educators in their professional careers. Additionally, accommodating educators in terms of time and preferred instructional format for professional development opportunities may increase the likelihood that professional development offerings will be attended, in turn increasing educator knowledge and ability of educators to provide evidence-based practices in their classrooms.

Students who receive their education from knowledgeable, satisfied educators, who have a variety of teaching techniques at their disposal, can only

benefit. Teaching techniques for students with autism are plentiful, but may vary

from student to student and situation to situation. In addition to increasing

general content knowledge in the area of autism, collaborating with colleagues to

determine techniques directly applicable to a specific student and/or situation can

be extremely beneficial to educators, especially when offered in a personally

satisfying and personally accommodating professional development opportunity.

With continued increases in autism diagnoses (Autism Speaks, 2005 –

2011), it seems timely to address the issues of effectively educating students with

autism in order to meet the requirements set forth by the No Child Left Behind

Act (2002) and the Individuals with Disabilities Educational Improvement Act

(2004). Because educational opportunities are seen as one of the most effective

ways to provide educators with the knowledge base to effectively educate

students with autism (National Research Council, 2001), researching successful

outcomes in professional development opportunities is significant for both

educators and their students. Research shows that student learning is positively

affected by adult professional learning, and when teachers feel positive about

professional development, and themselves, they are more likely to positively

affect students (Eaker & Keating, 2009).

Overview of Methodology

Research questions for this study were developed in an attempt to

determine the most effective way to conduct professional development in the area

of autism and analyze specific factors that may increase or decrease effectiveness.

The research questions included the following:

>*Question 1:* In what ways does format delivery, face-to-face or online, of a professional development course in the area of autism impact the quality of collaborative problem solving for teachers?

>*Question 2:* How did educators' attitudes toward using technology as a means of collaboration change as a result of participating in face-to-face or online delivery formats in a professional development course in the area of autism?

Specific professional development strategies employed in the current study were chosen based on a review of the literature, and two previous studies. The first study assessed the needs of teachers in the school district studied in regards to professional development topics and methods in the area of autism (Bruening, McCoy & Gehrke, 2009), and the second study evaluated the effectiveness of in-service formats in the school district for the delivery of content and collaboration in the area of Autism Spectrum Disorder (ASD), and High Functioning Autism/Asperger's Syndrome (HFA/AS) (Bruening, 2010). Results of these studies and the review of literature framed the theoretical perspectives for the current study, which include the notion that collaborative problem-solving may be an effective means of professional development in the area of autism, and that this collaboration may be just as, if not more effective in an online format versus a traditional, face-to-face format.

The professional development course delivered as a basis for this study was developed in the following manner:

- Teachers in the school district participated in a focus group to determine needs for professional development in the area of autism.

- Based on these needs, a five-week professional development course was designed, incorporating a PowerPoint presentation of content, a discussion board (online format) or discussion group (face-to-face format) for collaboration and individualized problem-solving related to teacher needs, and participant reflection.

- The professional development course was offered to all educators in the district, and participants voluntarily enrolled.

- Participants were randomly assigned to either an online or face-to-face section of the course.

- Participants were required to post to the discussion board (online) or participate in discussion (face-to-face) and write individual reflections weekly, based on specific procedures.

- A content knowledge test and attitudes survey was given on the first and last day of the course.

Weekly written reflections (Research Question 1) and comments on the pre- and post-survey (Research Question 2), produced the data for this study, and were analyzed qualitatively. The qualitative methodology in this study was chosen as a means to make sense of and interpret participants' written statements,

and to attempt to determine if one professional development course format was more effective than another, especially in the area of collaboration.

An extensive description of methodology used in this study is included in Chapter 3, including detailed information on the research perspective, research participants, research questions, research context, course procedures, data collection procedures, and the data analysis process.

Limitations of the Study

This study has boundaries that should be noted. The study was conducted with a group of educators who chose to participate in the professional development course. It was conducted with one group of educators, in one public school district. The specific make-up of both the group of participants and the school district may have its own set of characteristics that affect the results of the study. The number of participants (twenty-three) and the length of time that the professional development course was offered (fifteen hours) may be limited in terms of data production, and an increase in either or both may have produced different results. The professional role of the researcher as a public special educator may have produced bias in terms of the interpretation and perceived significance of specific results. Caution should be taken when attempting to generalize results of study, or any other aspect of the study.

Definitions of Key Terms

The following key terms are used throughout this dissertation. A definition for each is given here.

Autism Spectrum Disorder (ASD): a group of developmental disorders characterized by impairments in communication and socialization and often accompanied by repetitive behaviors or restricted interests

Collaboration: to work together with others surrounding a common purpose

Discussion Board: an online discussion site where people can hold discussions in the form of posted messages

Face-to-Face: information or in-service (class session) in the physical presence of instructor and other participants

General Education Teacher: a teacher who teaches in a typical classroom setting

High-Functioning Autism or Asperger's Syndrome: a neurological condition marked by difficulty with socialization and communication,considered as part of the spectrum of autism disorders but less severe

Individualized Education Program (IEP): a document describing the educational needs and programming for a student receiving special education services

Individuals with Disabilities Education Act (IDEA): a United States federal law with its most recent reauthorization in 2004, governing how states and public agencies provide early intervention, special education, and related services to children with disabilities.

In-Service: training designed to develop the skills of people who are already working in a particular profession (interchangeable with professional development for purposes of this study)

Moodle: "Modular Object-Oriented Dynamic Learning Environment"; an open source course management system that provides an organized interface for learning and communicating over the Internet

No Child Left Behind (NCLB): a federal law passed under the George W. Bush administration (2002), representing legislation that attempts to achieve standards-based education reform

Online: information or in-service (class session) available through a computer or computer network

Qualitative Research: a method of inquiry utilized in many different academic disciplines, especially in the social sciences. Qualitative researchers seek an in-depth understanding of human behavior and the reasons for behavior.

Professional Development: the process of obtaining the skills, qualifications, and experience that allow you to make progress in your career (interchangeable with in-service for purposes of this study)

Resource Setting: term used to describe a program that provides instruction, materials and support services to students with identified disabilities who are assigned to a general classroom (most often) for more than 50% of their school day

Self-Contained Setting: term used to describe a special education class which provides services to students with intensive needs that cannot be met by the general education program; classes consist of more than 50% of the student's day

Special Education Teacher: a teacher who teaches students with special educational needs

Looking Ahead

The chapters that follow include a review of significant literature related to the characteristics of this study, detailed information on methodology used for data collection and analysis, results and interpretation of data following collection and analysis, summary and general recommendations.

Chapter 2

REVIEW OF THE LITERATURE

Parameters of the Search

Two reviews of literature were conducted to provide background information for this study, including a review of online instruction and a review of professional development. Aspects of both in relation to educating professionals who work with students with special needs, especially autism, were also included. The search was conducted using ERIC, e-journals, Dissertation Abstracts International, and Education Full Text Articles, for applicable information related to the advantages and disadvantages of online education, online education for in-service teachers, types of professional development (especially in education), online professional development and professional development in the areas of special education and autism. Because of the surge in online education in the 21st century and the constant evolution of professional development, literature was searched from 2000 on in an attempt to gather the most recent information possible. Occasionally, less recent research was used if it contained empirical evidence and/or important information in providing a background for the current research study. Only minor comparisons of the effectiveness of online versus face-to-face education were researched prior to the study (e.g. in this literature review), so as not to inflict a bias toward one method or the other before data analysis occurred. The literature reviews in their entirety follow.

Overview of Online Education

       As advancements in technology continue to expand our opportunities as a nation, accordingly, advancements in education continue to be made with technology at the forefront of a new educational movement. With increased access to computers and the Internet, online education has become the most prominent of these advancements, and only continues to become an increasingly ubiquitous method for educating people from primary through adult years. Ong, Lai, and Wang (2004) describe e-learning or online education, as "instructional content or learning experience delivered or enabled by electronic technologies," (p. 1). According to Yuen and Ma (2008), online education is based on three fundamental criteria: (1) it is networked, (2) it is delivered via a computer using standard Internet technology, and (3) it focuses on learning solutions that go beyond the traditional paradigms of training (Rosenberg, 2001). From college courses to on-the-job training, online education has brought to light a new wave of education, and is "expected to continue to shape the way people learn in this new century," (Kishore, Nassehzadeh, Tabrizi, Ozan, Aziz, & Wuensch, 2009, p. 400).

       Traditional, face-to-face education has long been challenged by instructional methods in the form of distance education. Correspondence courses have been available in the field of education since the late 19th century (Gabrielle, 2001), followed by courses delivered via audio tape, television, video tape, and CD-Rom, and most recently, online education via the Internet. In 2001, the U.S. Department of Education estimated that 100 new college courses per month were

being added to the online format (National Center for Education Statistics

(NCES), 2001), with many colleges and universities now offering complete online

degrees. In 2006 – 2007, distance education courses accounted for an estimated

12.2 million enrollments/registrations in higher education, with asynchronous

courses cited as the most widely used technology for the instructional delivery of

distance education (NCES, 2008). Today, Internet access and information

technologies have become increasingly available in homes, schools, libraries and

other student-accessible sites (Lim, Kim, Chen, & Ryder, 2008), allowing online

educational opportunities in college coursework and other forms of education

such as certifications and job-related trainings. For example, the U.S. Department

of Defense recently developed a learning network that uses online education to

make trainings available to the more than three million personnel in the military

(Artino, 2008; Fletcher, Tobias & Wisher, 2007). Furthermore, Donovant (2009)

conducted a study examining the efficacy of online education among American

police officers. Online trainings have been made available in a number of fields,

with real estate, healthcare, code enforcement (e.g. fire training, building code

training, etc.), sales, and management just scratching the tip of the iceberg.

Online education can take on a number of forms, and is unique in that it

offers students a great deal of variation in learning (Berkson, 2005). Popular

course management systems (especially in higher education) include WebCT,

Blackboard, and e-college (Bangert, 2004), though free and open-source software

is also widely used. Online courses can be instructor led or self paced, and can

incorporate just about any type of media accessible from the Internet. They can

be delivered completely online, or in conjunction with face-to-face meetings in a

format known as a "hybrid", or "blended" course.

The structure of many online courses today incorporates a large degree of

asynchronous communication, in which users are not directly communicating

with others in real-time. Rather, information may be posted or sent, and received

by others at a later time. This form of communication, including e-mail

exchanges and discussion boards, is currently the primary mode of delivery in

online education (Shi & Morrow, 2006), providing numerous opportunities for

educational interactivity (Topcu & Ubuz, 2008). Synchronous communication is

found in the traditional, face-to-face environment, as students and teacher are able

to communicate immediately, without delay (Avgerinou & Anderson, 2007).

Synchronous communication is also present in many forms of online education,

and can consist of elements such as chat rooms, text messaging, audio interfaces

that enable voice communication, and Web tools that allow instructors to direct

students' browsers to particular Web addresses, take polls, share the computer

desktop, write on a virtual whiteboard, record and archive sessions, and more (Shi

& Morrow, 2006). However, synchronous communication in the online

environment does not allow for the aspects of human interaction involved in

nonverbal communication, such as visual signs and body language (Avgerinou &

Anderson, 2007), on which many instructors and students say they depend.

Researching the Effectiveness of Online Education

Online education's rise in both developing and industrialized nations

makes it imperative that researchers study the adaptations of both student and

16

teacher to these environments (Oliver, Osborne, & Brady, 2009). Lim et al.

(2008) concur that it is crucial to study online education in order to improve

online teaching and student learning. Much research has been and continues to be

conducted in order to assess the effectiveness of online and hybrid instruction,

including comparisons to the effectiveness of face-to-face formats. The two most

widely researched aspects of online education include student performance and

student satisfaction (Pucel & Stertz, 2005). Lim et al., (2008) contend that in

order to improve online education and overall student learning, it is essential to

evaluate student perceptions of online courses. Instructor willingness and

satisfaction with the online course format is also of key importance to the overall

success of online education, as the nature of teaching online has brought about

changes to the role of instructor (Bennett & Lockyer, 2004). Most research in the

field of online education, however, has been done to address the feasibility of

online education within formal educational settings, as opposed to professional

development settings, which involves training for professionals in their current

field (Donavant, 2009).

Currently, various methods are being used to assess the value of online

education. For example, Walker & Kelly (2007) used a student satisfaction

survey in their research. Cicco (2009) used a learning-style assessment to

determine the relationship between the learning styles of students and their

satisfaction with online instruction. Topcu & Ubuz (2008) implemented a Web-

Based Course Attitude Scale (WBAS) (Ham, 2002), updated from the original

scale (Hiltz, 1994) to determine users' attitudes towards web-based courses. Lu

& Chiou (2010) used questionnaires to assess student learning styles, perceptions of the quality of four predictors they proposed would affect student satisfaction and overall satisfaction with the online learning format.

Other methods for assessing the effectiveness of online education have included the development of standards by which aspects of online courses are evaluated, and often developed. The Institute for Higher Education Policy (IHEP) recommends 24 benchmarks, covering seven categories that define excellence in online education. These seven categories include institutional support, course development, teaching/learning, course structure, student support, faculty support, and evaluation and assessment (IHEP, 2000).

Bangert (2008) developed an assessment called the Student Evaluation of Online Teaching Effectiveness (SEOTE), and found that four major factors concerning online education should be used in the assessment to evaluate the effectiveness of online education, including student-faculty interaction, active learning, time on task, and cooperation among students. The SEOTE, like many other assessment tools in the current literature, is based on teaching practices represented by Chickering and Gamson's (1987) Seven Principles of Effective Teaching. Chickering and Gamson (1987) take a constructivist approach to learning, contending that student success is related to effective teaching practices that encourage (1) student-faculty contact, (2) cooperation among students, (3) active learning, (4) prompt feedback, (5) time on task, (6) high expectations, and (7) respect for diverse talents and ways of learning. Though originally created for

18

traditional instruction, these principals lay the groundwork for many approaches to assessing online learning.

The aforementioned research methods are far from an exhaustive list, with additional research methods including case studies of both students and instructors engaged in online education, interviews, various analyses of reflections and messages written by students throughout the course, and more. Though research methods are plentiful, further research on the effectiveness of online instruction versus traditional classroom instruction is needed (Pucel & Stertz, 2005).

Current Research Findings

Research findings in the literature show mixed results, indicating both satisfaction and dissatisfaction with online education (Pucel & Stertz, 2005). Some learners participating in online education prefer the online mode to traditional modes, and vice versa. Still others tout and devalue aspects of both and find hybrid courses to be most effective. For example, Lim et al. (2008) investigated the effects of online, face-to-face and hybrid instructional delivery on student achievement in an undergraduate wellness course, finding that students in the online and hybrid learning groups had statistically significant higher levels of achievement than students in the face-to-face group. However, student satisfaction was only higher in the hybrid group when compared to the face-to-face group, and no difference in satisfaction was found between the online and face-to-face groups (Lim et al., 2008). Zhang (2005) reports that higher achievement in online education compared to face-to-face education supports

19

many previously published studies. By contrast, McFarland and Hamilton (2006) found no difference in student satisfaction or performance in online versus face-to-face classes, and Rivera and McAlister (2001) found that online instruction negatively impacted students. Terry (2007) conducted an assessment of graduate students enrolled in business education courses at a regional university, finding that student performance was equivalent across all three instructional modes, yet student satisfaction was significantly lower for online instruction. According to Rovai and Barnum (2008), each online course really needs to be evaluated separately due to the difficulty in generalizing findings from one course to the next.

Advantages of Online Instruction

Research shows numerous benefits to online instruction, as reported by stakeholders. Though some students report a greater sense of community in traditional educational settings, many students also report the opposite, finding a greater sense of community in online settings. Lu and Chiou (2010) believe that online courses facilitate learning communities, resulting in increased cooperation and the ability to assist one another in learning. Crawley, Fewell, and Sugar (2009) suggest that online instruction creates what is known as a "pajama effect," stemming from the casual, comfortable relationship students feel when interacting with peers and instructor as they sit home in their pajamas e-mailing people they quickly feel they know. Students may also enjoy learning with different people at different times, while not having to observe disrespectful behaviors such as chatting during a lecture (Cicco, 2009). Frequent intellectual conversations via

online discussions allow students to feel a sense of belonging to a group, creating a community more personal than traditional learning environments can provide (Crawley et al., 2009). Intellectual conversations can often be enhanced in the online environment, as online instruction allows students the ability to research through the Internet, books, or other resources, and then carefully plan out and build their thoughts and arguments with reasoning and evidence (Topcu & Ubuz, 2008). According to Maloney (1999), online instructors report higher quality interactions with online students, as opposed to traditional settings, as students have the opportunity to think at deeper levels, with reduced anxiety about contributing to class discussions.

Various studies report that online education can more effectively accommodate for various learning styles than traditional education. Online instruction provides a learner-centered approach that accounts for the various differences between learners, allowing learners to process course content and information using individually suitable methods (Masiello, Ramberg & Lonka, 2005). Lu and Chiou (2010) propose that online instruction allows learners to work at their own pace while allowing instructors to track the course of learners' progress more easily and objectively. Online instruction may also offer flexibility and convenience that traditional education cannot by extending learning opportunities to students who may be economically disadvantaged, geographically isolated, or unable to participate in a traditional classroom setting (Kishore et al., 2009). Online courses may have the potential to address the different sociological and emotional learning styles of students, and may involve

higher or lower levels of structure than traditional classroom settings, depending on student needs (Cicco, 2009).

Other benefits of online instruction include its temporal, geographic and platform independence combined with a consistent interface (Kearsley, 1998; Okula, 1999; Terry, 2007). Campbell (2006) conducted a case study of first-time online instructors, reporting that they found several advantages to online instruction including active student involvement in their own education, student construction of knowledge, the ability to keep track of and measure responses by students, and improved work quality due to access to the work of their peers. They also found that participating in online courses increased technological confidence of students. Today, technology skills are necessary in the workplace, and participation in online courses can help facilitate those skills (Lim et al., 2008).

Disadvantages of Online Instruction

Though many advantages of online instruction are reported in the literature, there are also several disadvantages reported. Because online education is still relatively new, a new skill set for both student and instructor is needed to be successful with online learning, as the learning environment is very different from traditional learning environments (Romiszowski, 2004; Wagner et al., 2008). Online learning environments incorporate complex and dynamic relationships involving content, pedagogy and technology, making evaluation of online educational programs difficult (Bangert, 2008). Many proponents of traditional instruction also claim that online instruction lacks the element of direct

22

instruction and interaction needed for an effective learning environment (Beard, Harper, & Riley, 2004). In a study done by Walker and Kelly (2007), students reported that feedback from online instructors was often not constructive enough to improve, and that difficulties with computer programs, broken links and Internet sites often caused high levels of stress. Campbell's (2006) case study of the first-time experience of online instructors found that instructors were concerned about clarity, loss of personal or intimate interactions, and misinterpretations resulting from online communication.

Other reported drawbacks of online education include restricted sophistication and creativity, potential resistance of students and instructors to a completely new teaching paradigm, privacy, security and copyright issues, and possible lack of uniform quality (McCormak & Jones, 1998; Terry, 2007). Of course, there is always the possibility that technology can break down in some form as well, causing anxiety and stress on the part of both the student and instructor, as well as lost instructional time for the student. According to Terry (2007), the hybrid mode may have the potential to combine the attributes of both online instruction and face-to-face instruction, allowing busy students and professionals limited in-class time while still maintaining sufficient contact time with the instructor and peers to promote interaction and address any issues. However, he also presents the caveat that these combined attributes may not be the best attributes of both online and face-to-face instruction (Terry, 2007).

Role of Students in Online Education

Though course content can remain very similar, the roles of students may be very different in online versus face-to-face instruction. Students are often faced with environments and tasks that are new to them, as well as, structures that make them ultimately responsible for keeping up with their own work and knowledge acquisition. Because instructors in the online environment are seen more as facilitators than central sources of knowledge and assistance, students must possess, or at least acquire, many characteristics that will help them to be their own teacher. Students usually must be much more independent in online settings, requiring high motivation, commitment to learning, and technical sophistication (Wagner et al., 2008; Huynh, Umesh, & Valachich, 2003). Neuhauser (2002) also states that in order to achieve a successful learning experience, learners must possess self-discipline, the ability to self-start, and a strong understanding of technology. Sahin and Shelley (2008) report that the computer expertise of students affects the perceived usefulness of and satisfaction with online education. Online instruction is seen as a way to keep students technologically savvy, while keeping them well educated in their field (Massy, 2005). However, in order for this aspect of online education to be successfully executed, students must constantly work to improve their own technological skills and stay well educated. One way to do this is through meaningful and continuous interactions with both instructor and peers. In a study of three types of learner interactions, Jung, Choi, Lim & Leem (2002) found that interaction with instructors and peers enhance learning and active participation in online

discussion. According to Lewis and Abdul-Hamid (2006), instructors believe it is important for students to engage with each other through social interactions, whether or not these interactions are directly related to course content.

In a study of educational entities offering online educational programs, Kerr, Rynearson, and Kerr (2006) found that issues arose for students in computer literacy, technology usage, communication skills, readiness, persistence, self-efficacy, learning styles, lifestyle, and other student characteristics. Topcu and Ubuz (2008) propose that students who are aware of their metacognitive abilities, that is, the ability to explore, identify and monitor their thinking and learning (Gilbert & Dabbagh, 2005; Hill & Hannafin, 1997), will be more successful in the online environment. Learners must decide when and how often they participate in the course and overall learning process, including which contributions to read and answer (Schwan, Straub & Hesse, 2002). They must also manage their rate and timing of instruction and homework (Shimazu, 2005). In general, students must be more independent, organized, intrinsically motivated, and responsible for their own educations in an online environment. However, for many students, these responsibilities are minimal when compared with difficulties or negative thoughts they might have when it comes to participating in traditional courses.

Role of Instructors in Online Education

Bonk, Kinley, Hara, and Paz-Dennen (2001) identified four major roles of the online instructor including pedagogical, social, managerial, and technological roles. Bonk et al. (2001) and Avgerinou and Anderson (2007) elaborate on these roles as follows. The pedagogical characteristics of online instructors include

25

assuming the role of facilitator which involves asking questions, probing responses, encouraging student knowledge building and linking, summarizing or weaving discussion, supporting and directing interactive discussion, designing a variety of educational experiences, providing feedback, and referring to outside resources and experts in the field. The social characteristics include creating a nurturing, community-like environment, conveying a positive tone, displaying empathy and outreach, using humor, and personalizing with one's own experiences. The managerial characteristics include effectively coordinating assignments, managing discussion forums, and handling the overall course structure. The technological characteristics include assisting students with user technology and systems issues, diagnosing and clarifying problems encountered, notifying students when technological problems arise, and explaining limitations.

Research indicates that preparing goals, objectives, and content in online courses does not differ greatly from doing the same in face-to-face courses (Xu & Morris, 2007). However, instructors must also be technically sophisticated when teaching an online course (Wagner et al., 2008), and must learn to shift roles from that of the students' primary source of knowledge to manager of knowledge resources (Romiszowski, 2004). Not only must instructors keep up on their own technological skills, but prior to implementing an online course, instructors should make sure students have the necessary computer expertise to effectively navigate the course (Sahin & Shelley, 2008). Though technology is a major player in the development of online courses, research shows that pedagogy itself is the most important aspect to their success (Palloff & Pratt, 2001).

Research has also reported that online instruction may be more labor intensive than face-to-face instruction, (Doughty, Spector, & Yonai, 2003). Doughty et al., (2003) found that faculty and support staff spent almost twice as many hours providing online instruction, as opposed to traditional instruction. Lorenzetti (2004) also found considerable evidence that additional preparation time was required for teaching online courses. This may be due in part to the time it takes to look through discussions and oftentimes grade them using a rubric. In traditional educational settings, discussions are in real-time, and are not usually graded. It may also take more time to access assignments from each student, as each one must be opened individually online and then sent back to the students, rather than simply grading from and handing back assignments in one, big pile. Though situations such as these may take more time, time is also being saved on travel to and from a traditional classroom.

Despite some possible disadvantages for online instructors, Knowlton (2000) suggests that the role of instructors should be to design a course that helps students to develop and implement goals by establishing course objectives and learning outcomes, and providing feedback and evaluation of work. In general, the learning environment must be successful in numerous ways if students are to perform well and be satisfied with their experience. Upon reviewing empirical studies, Hacker and Niederhauser (2000) outlined five learning principles to create a successful online learning environment and effective student learning outcomes, including requiring that students become active participants in their own learning, using examples to ground learning, facilitating collaborative

27

problem solving, providing appropriate feedback, and using motivation to challenge and improve the self-efficacy of students. To accomplish this, clearly expressing grading expectations (when necessary) and overall requirements is essential (Lewis & Abdul-Hamid, 2006) so that students can become independent learners. Moreover, issues selected for discussion boards should be interesting and thought provoking (Lewis & Abdul-Hamid, 2006) increasing motivation to participate in the course, and prompt and substantive feedback should also be provided to students (Lewis & Abdul-Hamid, 2006) providing them with the chance to problem solve and improve. Lindsey-North (2000) proposes that instructors should take advantage of opportunities to enhance student learning and dialogue though e-mails, posted discussion boards, and real-time chats (Braun, 2008), rather than simply using the online environment as a forum for delivering instruction. Instruction in the online format includes more than just lectures (Braun, 2008), and must incorporate various assignments, asynchronous reflection, often synchronous conversation, and a variety of media (Lebaron & Miller, 2005).

Being open and accessible to students and their needs is also essential in creating a successful online environment. Instructors may benefit from continuously assessing their courses in an attempt to develop strategies that prevent emotional and cognitive disconnection experienced by many students in online course environments (Lewis & Abdul-Hamid, 2006). Instructors should become aware of student needs that may affect learning, not only academically, but culturally, socially and emotionally. Having a visible persona and being

energetic are considered keys to successful online instruction (Lewis & Abdul-Hamid, 2006). Cultural awareness must also be kept in mind in any type of formal educational setting, as who people are and what they bring into these settings can have a great impact on how course design is approached (Burnham, 2005). Instructors must be aware of their own cultural biases, however innate, and be certain that they do not bring them into the educational setting. Another student need that may not be readily visible is that of gender difference. After finding empirical evidence that gender played a role in the relationship between learning style and student engagement in online classes, Garland and Martin (2005) argue that student learning styles, and even student gender, must be taken into account when developing online courses. However, there are mixed beliefs on how heavily these aspects should be addressed (Lu & Chiou, 2010). Sahin and Shelley (2008) suggest that designing, developing and delivering online instruction requires that the students' needs and perceptions should be central, meeting student expectations.

Though interactions with students are often deemed important for the success of an online course, Braun (2008) found that quality content and a need for independence and flexibility rank higher on a student's list of needs. The most common factors cited by NCES (2007) as affecting online (distance) education decisions to a major extent were meeting student demand for flexible schedules, providing access to college for students who would otherwise not have access, making more courses available, and seeking to increase student enrollment. These findings once again speak to the needs of students. Although

29

quality content and interactions may be of high importance to the instructor and many students, instructors should also remain aware of the fact that their ability to facilitate a flexible course that fosters independence is essential.

Online Instruction for In-Service Teachers

Though current research is valuable and can be applied to many different settings, as Donovant (2009) mentioned, little research is being conducted on the effectiveness of online education in professional development settings, though many occupations are moving toward models that partially or fully incorporate online instruction into their trainings. Additionally, though education and training (or professional development) share many of the same psychological constructs such as learning, transfer, memory and motivation, they are distinguished by fundamental differences in their objectives, performance outcomes and application of the instruction (Bonk & Wisher, 2000; United States General Accounting Office 2003), suggesting a need for research in both areas.

One field that is making a strong movement toward using technology in professional development is the field of teacher education. Teacher professional development is often viewed as the primary method for improving practice (Lieberman & Pointer Mace, 2010), and teachers have always participated in ongoing training after receiving their teaching degrees, as required by law to maintain updated certifications. However, these trainings have been considered by many teachers to be fragmented, disconnected, and irrelevant to the real problems they face in their classroom (Lieberman & Pointer Mace, 2010). Furthermore, after a long and often tiresome day of teaching, teachers do not

30

always wish to attend trainings, and many do not have the time (Killeavy &

Moloney, 2010; Duncan-Howell, 2010). Typically, little class-release time is

provided to teachers, and professional development is restricted to a handful of

workshops on district-chosen topics (Lerman, Vorndran, Addison, & Contrucci

Kuhn, 2004). Blanton (2009) points out that teachers, like their students, learn in

a variety of ways, potentially making a professional development opportunity

perfect for one teacher and not another. In a study done by Artino (2007) on

online professional development in the U.S. Military, it was found that learners

were more satisfied with trainings when they perceived the tasks as valuable, and

felt that effective instructional methods were used. Furthermore, mandatory

professional development may result in anger, a lack of motivation, and a feeling

of disenfranchisement, fostering negative attitudes that are potentially more

harmful to organizations than no training at all (Donovant, 2009). Online

instruction may provide a more flexible, less micromanaged environment, in

which professionals are responsible for their own learning, constructing

knowledge that is relevant to their experiences and field of expertise.

Online instruction in professional development has also become a way to

incorporate flexibility while accommodating for different learning styles and

needs. It provides opportunities for teachers to collaborate, reflect with other

teachers and experts (Hunter, 2002) and interact, learn and access knowledge and

resources all within a common social space (Duncan-Howell, 2010). Online

communities are active learning environments in which teachers have

opportunities to participate in conversations and inquiry through e-mail, chat

rooms, and postings (Leask & Younie, 2001), providing teachers with a rich source of professional learning (Duncan-Howell, 2010). According to Donovant (2009), however, satisfaction with online instruction in the realm of adult learning may depend on previous exposure to online environments. That is, if adults have had previous exposure to the online environment, they are more likely to be satisfied with new online instruction. Donavant (2009) also asserts that there is a need within adult education to research the impact of online education on different learner groups and their attitudes toward themselves and the subject matter at hand. Although online instruction might seem to be a favorable option for professional development, further research is needed to strengthen the argument for its effectiveness in the field of education, as well as, other fields, and as Rovai and Barnum (2008) suggest, this can only be determined by assessing online education programs individually.

Conclusions for Online Education

Much research in the field of education points to the benefit of incorporating online learning environments into available educational mediums, or replacing them entirely with online instruction. Advantages such as flexibility in time and location, as well as the ability to participate in classes at the learner's convenience, make online education an attractive option for those who may not feel their lives are conducive to traditional forms of instruction. Learners who participate in online instruction, whether by choice or mandate, must be aware of the skills and characteristics required to be successful in this type of environment, and ongoing research is being conducted to determine what these skills and

characteristics might be. Not only must learners be aware of the new roles they

must take on in the online environment, but instructors must do the same. Many

instructors believe there are aspects of online education that make planning and

maintaining a course more difficult than doing so for traditional courses.

However, this often depends on the instructor's familiarity with the online

environment, and willingness to adapt to change.

The effectiveness of online instruction continues to be researched using

many methods, providing instructors with opportunities to learn from the

feedback and performance of others and apply this new knowledge to their own

practices. Mixed findings are prevalent when it comes to comparisons between

online, hybrid, and traditional (face-to-face) instruction, requiring that research be

continued to attempt to find generalizations that might improve the field as a

whole. Evaluation of individual online courses and programs is also necessary to

improve specific course content, structure and management. The current

literature provides examples of a number of research methods that may be

effective in assessing the efficacy of online education.

Most of the current research has been done to evaluate online instruction

in higher education, leaving a need for research in other areas that are moving

toward online instruction, such as on-the-job training, or professional

development. Due to increases in the availability of technology in educational

settings, professional development for teachers is one area that has seen an

increase in the use of online education. Current research reveals pros and cons of

both online and traditional training methods for teachers. As the potential for

33

both online and hybrid professional development increases, further research may provide the opportunity for improvements, making professional development for teachers an increasingly useful tool for improving our educational system as a whole.

Overview of Professional Development

"If dogmas and institutions tremble when a new idea spears, this shiver is nothing to what would happen if the idea were armed with the means for the continuous discovery of new truth and the criticism of old belief," (Dewey, 1999/1929, p. 76). In this quotation, John Dewey suggests that the power of new ideas can challenge philosophical "truths" within an organization or way of thinking (Kesson & Henderson, 2010). Ideologies and institutions, though quite possibly grounded in truths derived from research and practice, are constantly evolving as our world evolves, requiring challenges to these truths, new ways of thinking, and the dissemination of new knowledge and skills to stakeholders. From this notion, stems the concept of professional development.

From extensive college coursework, to internships, to brief, on-the-job training, most jobs require at least some type of preparation prior to employment. However, prior preparation may not always be relevant to a specific job, or requirements of a job and the successful implementation of job duties may change over time, necessitating updates to skills and knowledge base. Training programs in the workplace can be thought of as attempts to improve work performance (Hung, 2010), and are often functions of individual and organizational factors (Runhaar, Sanders & Yang, 2010). Classes, conferences, and other forms of

training for professionals currently in their field, often called professional development, have long been used in the professional world, to keep employees up-to-date on new requirements in skills and knowledge. The method by which this new information is conveyed, however, can vary from field to field, site to site, and even individual to individual. Furthermore, as our nation evolves to include new research in adult education, new innovations in technology, and new mandates for accountability, these methods change over time with the intent to become increasingly more valuable to both employees and their job sites in general.

Research in the area of professional development has shown a wide variety of professional development opportunities being used in the workplace, each with their own advantages and disadvantages. McCabe (2008) suggests that a combination of theory and practice has been reported to be essential to the success of the professional. However, what is effective for one company may not be effective for another, though generalization and streamlining of methods is often a highly sought after goal, especially within the same field. Some more commonly used methods of professional development in the current literature include brief workshops put on by co-employees, especially those with more experience, sending employees to longer workshops or conferences put on by experts in the field, mentoring at the job site, and brief or ongoing trainings at the job site. Online trainings have also become more prevalent, as technology opportunities increase. For employers, one of the most critical questions that must be answered is, "which method works best?" Several factors must be taken

into account to make this determination, including feedback from employees regarding their satisfaction with the professional development, data on the many aspects of work performance after the professional development takes place, and the overall progress of the company. The following are examples taken from the current literature, regarding some of the current professional development strategies being used in various fields. The examples are far from exhaustive, and represent only a small portion of the various types of professional development that currently exist.

Typical Professional Development Models and Techniques

Employee-chosen subject matter.

One of the most effective ways to make certain employees are satisfied with professional development is to offer them a say in what types of professional development they feel might benefit them the most. By offering this type of collaboration in the workplace, employees can take on a sense of ownership in what they will be learning, and may not feel as adverse to professional development, even if it is required rather than elective. Company employees may disagree with upper level management as to what constitutes the most effective and necessary professional development (Taylor, 2010). In one method of circumventing this, a training program developer and facilitator for a large, eastern United States police department reported that he used what is known as a Facilitator as Mediator (FAM) model to enact successful professional development via classes, which involved the negotiation of class content between employees and management (Taylor). Taylor claims that this model is a valuable

36

way to eradicate the negative side effects of more confrontational types of professional development, and it has the potential to make positive intra-organizational change possible.

Classes or workshops.

 Classes or workshops are commonly used professional development strategies, though it is possible that they must be completed on the professional's own time. In fact, most professions seem to offer classes and workshops, at least in some form. For example, real estate agents and brokers are required to maintain educational standards in their fields by taking continuing education courses usually in the form of a workshop facilitated by an experienced professional in the field (Barker, 2008).   Another example comes from the Research Field Station of McHenry County Conservation District, located about 30 miles northwest of Chicago. The Conservation District developed a certification program in 2007 to train practitioners, involving fifteen day-long workshops (Simpson, 2010), and maintains that these have been successful tools for professional development. In the field of physical therapy, a number of courses are offered to increase the knowledge of practicing physical therapists in various areas of physical therapy, including 3-day, week-long, and even 10-month long courses (Li, Hurkmans, Sayre, & Vilet Vlieland, 2010). Other fields that offer classes and workshops include anthropology (Leitner, 2010), dentistry (Wu, Zhang, Jiang, & Guo, 2009) and many more.

Portfolios.

Keeping track of individual progress and development is becoming an increasingly used technique for professional development in an attempt to keep professionals aware of their proficiencies and shortcomings through self-directed learning. Keeping track of this progress can be done in a variety of ways, with one of the most notable being the creation of work products such as portfolios. For example, principals in urban South Africa created professional portfolios as part of their professional development training, with the majority of principals claiming that they benefitted from this method because it alleviated some of the pressure of basing progress on end-of-the year student examinations, encouraged them to consistently work, allowed them plentiful opportunities to reflect on their learning, and made self-directed learning possible (Mestry & Schmidt, 2010). Additionally, in a study done by Tulinius & Holge-Hazelton (2010), general practitioners used electronic portfolios in combination with other methods to facilitate effective professional development.

Assigned readings.

Continuing education for professionals often consists of the individual learning on his/her own by reading assigned material such as professional journal articles, full books or portions of books, or other assigned text. Upon completion, workers then take an exam on the material covered, and usually must obtain a certain score before they are considered to have "passed," or learned what was expected of them. Often, workers will earn credits for passing the exams that are necessary to stay active in their field. The field of ophthalmology is one such

field that offers this type of professional development (Clinical and Experimental

Ophthalmology, 2010), as does the field of psychology, as a requirement for

Board Certified Behavior Analysts (Behavior Analyst Certification Board, 2010).

A number of other fields provide these opportunities as well.

Online training.

According to Yuen and Ma (2008), online education is based on three

fundamental criteria: (1) it is networked, (2) it is delivered via a computer using

standard Internet technology, and (3) it focuses on learning solutions that go

beyond the traditional paradigms of training (Rosenberg, 2001). Online education

can take on a number of forms, and is unique in that it offers learners a great deal

of variation in learning (Berkson, 2005). Various forms of professional

development can take place online including webinars (online workshops,

training, presentations or conferences), discussions with other professionals, and

reflections on personal progress. Many fields are moving toward online

instruction to provide training to employees including the fields of real estate, law

enforcement (Donovant, 2009), and the military (Artino, 2008). Professionals in

the field of mechanical engineering used webinars to enhance professional

development opportunities, contending that they were affordable, timely,

productive and accessible (Barton, 2010). In addition to solely online

professional development, hybrid methods are also being implemented, which

include elements of both online and face-to-face professional development.

Professional Development for Teachers

Kesson and Henderson (2010) contend that the ultimate goal of education in the United States should be to prepare citizens to live in a democratic society. The field of education is relentlessly changing as our society changes, making it necessary that teachers and other professionals in the field adjust to accommodate (Duncan-Howell, 2010). As instructional methods evolve, teachers are required to acquire new knowledge or skills, which must then be included in classroom practices (Duncan-Howell). Though teachers may feel that college coursework has prepared them to successfully take on their own classroom and stay abreast of these evolving methods, the foundational courses in teacher education are often disconnected from practice, focusing on theories of child development, and philosophy and history of education (Lieberman & Pointer Mace, 2010). In fact, Blanton (2009) argues that it is impossible to learn all you need to know about teaching through college coursework.

Professional development offered by schools and school districts is one of the most widely-used methods to help teachers acquire new knowledge and skills, and stay up to date in changing times. Just as in other professions, continuing education is imperative so that educators remain cognizant of best practices in the field (Kesson & Henderson, 2010). Recent literature conceptualizes teachers' professional development as a learning process within the context of the school, which occurs in the workplace throughout a teacher's career (Putnam & Borko, 2000). Current research is increasingly showing a link between professional development and both student achievement and school reform (Kesson &

Henderson, 2010). However, lack of relevant content and applicability in professional development in education has long been a voiced criticism (Guskey, 2002). Professional development offerings often include isolated curriculum initiatives, the latest teaching fad, or information designed to help teachers to teach to the test (Kesson & Henderson, 2010). Furthermore, current practices in providing professional development often include offering these opportunities after school or during school holidays, which may not be as effective as first hoped (Duncan-Howell, 2010), and current research suggests that these short workshops often do not have lasting effects on pedagogy (Boyle, While & Boyle, 2004).

Considerable public funds have been spent on professional development at the federal, state, and local levels, with $3 billion being spent in 2008 alone on Title II state grants for improving teacher quality, which is just one source of federal funding for professional development (Hochberg & Desimone, 2010; U. S. Department of Education, 2008). The current prevalence of high stakes accountability in the United States, makes it a requirement that school districts demonstrate the effectiveness of professional development programs (Ebert & Crippen, 2010). Moreover, the No Child Left Behind Act (NCLB) mandates that all students reach certain academic standards regardless of ability or other outside factors (No Child Left Behind Act, 2002). Sprague (2006) suggests that teacher educators need to be familiar with what professional development approaches foster necessary changes in teaching practices and implement evidence-based practices, while making the most positive impact on K-12 student learning. Vo

and Nguyen (2009) propose that reform is needed in teacher education at both the pre-service and in-service level. More and more, teachers are also realizing the essential role leadership at the district level plays in school improvements, especially when it comes to educating teachers, (Eaker & Keating, 2009).

Types of Professional Development in Education

Like other fields, the field of education boasts a variety of methods to educate their employees. In addition to the professional development opportunities listed above, models for professional development also exist that are more well-known in education. Though most professional development opportunities mean well, unavoidably, some are more effective than others. Knowledge of which professional activities are the most effective might be based on educator feedback, data regarding student success after implementing strategies or concepts learned in professional development, or on overall school or district progress in an area related to a professional development opportunity. Professional activities such as reading, experimenting, reflection and collaborating have been discussed in the literature (Runhaar, Sanders, & Yang, 2009). The format for these activities can range from direct instruction in particular practices to more natural, question-and-answer formats based on teachers' ideas and needs (Hill, 2007). Additionally, professional development opportunities can target individual teachers or groups of teachers, such as teachers in a particular subject area or an entire school faculty (Hawley & Valli, 1999).

Kesson and Henderson (2010, p. 215 - 216) suggest that reforms in professional development have led to the following aims:

- Acquisition of more in-depth content knowledge.

- Learning how to set and achieve high academic standards.

- Development of curriculum units with more sophisticated content that can be implemented in classrooms.

- Learning new instructional methods to teach challenging content.

- Developing capacity to teach to a variety of learning styles and differentiate instruction.

- Gaining familiarity with 'data' and how to read data so as to increase student achievement, and

- Creating learning communities for discussion and reflection with colleagues about best practices.

Based on current literature, the following are some frequently used methods for professional development in education:

Professional learning communities.

Shulman and Shulman (2004) posit that, "An accomplished teacher is a member of a professional community who is ready, willing and able to teach and to learn from his or her teaching experiences," (p. 259). Teachers who work in isolation frequently fall back on familiar practices, creating the need for collaboration through the sharing of knowledge and ideas. Professional learning communities are becoming increasingly prevalent as forms of professional development in Canada and the United States (Servage, 2009). Being a part of a

43

professional community involves sharing ideas and experiences with others, while learning from one another in a continuous exchange of thoughts and information. Wenger (1998) describes these communities as a group of professionals that engage in the social production of meaning. He goes on to suggest that they also involve sustained mutual relationships, engaging in activities and sharing with one another, knowing what others can do, and rapid exchange and dissemination of information. In other fields research has led to the understanding that learning is social rather than solely individual (Lieberman & Pointer Mace, 2010), and this is now a widely accepted theory as well, in education. Rovai (2001) claims that continuous participation in a community facilitates an increase in useful information access by using the knowledge base of the community. This would seemingly be an excellent opportunity for teachers to increase their confidence, camaraderie and skills. However, based on their analysis of teachers' communications in an online community, Sing and Khine (2006) contend that in-depth knowledge building discourse can only happen when teachers challenge the cultural/professional norm of niceness. Teachers may be intimidated by sharing for fear that they will jeopardize a collegial relationship or make others critical of their own practices, though Kreijns, Kirschner and Jochems (2003) suggest that informal sharing and having a shared history are crucial for developing a community.

Discussion groups may also be considered to be a type of professional learning community, depending on the content involved. In a study done by MacPherson (2010), university teacher educators, pre-service teachers, and

collaborating teachers thought to be experts in their field were placed in groups.

Each group of three collaborated weekly through discussion which included

confidential, online conversations about situations identified by the teacher

candidate during their practicum experiences. MacPherson concluded that the use

of open-ended, naturalistic conversations as opposed to structured interviews or

dialogues offered participants more flexibility and greater ability to analyze

decision-making processes.

Gajda & Koliba (2008) suggest a collaborative model called the Teacher

Collaboration Cycle of Inquiry that is often used to guide and evaluate

collaboration in professional learning communities. Indicators of quality

collaboration in the Teacher Collaboration Cycle of Inquiry include dialogue,

decision-making, action and evaluation, all surrounding a common purpose.

Gajda and Koliba contend that high-quality dialogue is demonstrated when

discussions are organized, focus on analysis of teaching practices and student

performance, and when all group members participate equally. High-quality

decision-making is demonstrated when a group determines, both collectively and

individually, what practices they will initiate, continue or discontinue, all in an

effort to cultivate effective teaching practices and student success. Action is of

high-quality when each group member regularly implements, maintains or

discontinues specific teaching practices as a result of group decision-making, and

evaluation is of high-quality when the group regularly analyzes their actions,

forming the basis for further dialogue and decision-making.

Project-based professional development.

Frey (2009) conducted a study with special educators using what is known as project-based professional development. This type of professional development consisted of online content involving a project (an individualized intervention) that was implemented by teachers in their classrooms. Results indicated that implementing project-based professional development helped teachers to gain a more comprehensive understanding and improved skills related to the subject matter. Additionally, students showed marked improvement in class performance during the study, affecting teachers' readiness to implement evidence-based strategies into their classrooms in the future (Frey, 2009). As many researchers suggest, directly implementing what is learned in professional development can be an extremely effective technique for student success (Hughes, Kerr & Ooms, 2005; McCabe, 2008).

Reflective professional development.

The importance of reflective practice in teacher education has long been acknowledged by educational theorists (Lai & Calandra, 2010). Bean and Stevens (2002) state that many teacher education programs worldwide believe the ability of teachers to reflect on their work is the hallmark of an effective educator, and in recent years, the reflective approach has become a key paradigm in teacher education (Clegg, Tan & Saeidi, 2002; Tochon 1999). Darling-Hammond and Bransford (2005) agree that evaluating one's actions is effective for improving practices. According to Clarke (2003), reflection is a process of internal dialogue made possible by thinking or writing and through conversations and collaborative

reflections with others. Reflection may help teachers to develop a deeper understanding of their own teaching practices and overall greater teaching effectiveness (Killeavy & Moloney, 2010). In general, the United States has yet to fully recognize the power of teacher analysis of their own practices as a strong, beneficial method of professional development (Darling-Hammond, Chung-Wei, Adree, Richardson & Orphanos, 2009), though the benefits have been pointed to numerous times in the research. Though it may be assumed that teachers are familiar with reflection methods through previous college coursework, Killeavy and Maloney (2010) found that teachers may actually need support to compose meaningful reflections. To accomplish a feat such as this, Bean and Stevens (2002) posit that exploring the role of particular elements of reflection, including shared reflections, references to past, present and future experiences, and scaffolding may be beneficial. Scaffolding includes planning reflections and modeling the reflection process (Bean & Stevens), and traditionally occurs through personal interactions between students and instructors (Lai & Calandra, 2010). They believe various forms of reflection need to be evaluated to determine their success in drawing out thoughtful reflection, including what form is most effective, what roles reflection assumes in teachers' practices and beliefs, and how teacher educators can best make use of reflections (Bean & Stevens, 2002). Lai and Calandra (2010) observed the same type of problem and believe that using scaffolding in reflection writing may be useful.

Online professional development.

According to Lieberman and Pointer Mace (2010), teacher professional development is thriving online. Online instruction has a number of characteristics that make it an increasingly valuable professional development method in education including its ability to be implemented at times and places most convenient for the learner, and its wide variety of available instructional options (Pucel & Stertz, 2005). The Internet facilitates opportunities for teachers to collaborate and reflect in conjunction with other teachers and experts outside of their workplace (Hunter, 2002). Online communities are also thought to be active learning environments in which teachers have opportunities to participate in conversations and inquiry through e-mail, chat rooms, and postings (Leask & Younie, 2001), providing teachers with a rich source of professional learning (Duncan-Howell, 2010).

Recently there has been a move to provide online instruction in the field of teacher education (Pucel & Stertz, 2005). For example, with the rise in popularity and convenience of electronic portfolios, teachers are now being frequently asked to complete reflections online (Anders & Brooks 1994; Lai & Calandra 2007; Ruan & Beach 2005), and Romeo and Caron (1999) contend that electronic modes of dialogue may support reflective practices. Wenger (1998) suggests that technology usage can expand relationships within a community of practice, facilitating dialogue and connections to other communities rather than replacing dialogue and connections. Sutherland-Smith (2002) suggests that a technological way of thinking is required in the teaching profession, though the

attitudes and technological abilities of teachers vary greatly. Although it is
technologically possible to provide teachers with plentiful opportunities to take
part in educational activities, they must first construct the social, cultural, and
cognitive dimensions of the learning environment before they can benefit from
using these new technologies (Sing & Khine, 2006).

Collaboration in online professional development.

Online communication has been reported to facilitate collaborative
professional development, which includes information and strategy sharing,
cultivating teacher competencies, and constructing reflective communities (Berge
& Collins, 1998; Collison, Elbaum, Haavind & Tinker, 2000). Frey's (2009)
study of online, project-based learning proved that online collaborative learning
communities were effective for in-service teachers, allowing participants to share
their experiences and reflections with peers. However, debate has long existed
over the possible reduction in quality and instructional success of online
instruction in favor of flexibility and convenience (Pucel & Stertz, 2005). In fact,
the results of a study in which student evaluations were used to assess the
effectiveness of online versus traditional instruction for teachers indicated no
significant differences (Pucel & Stertz).

Results are mixed when it comes to the effectiveness of online instruction
in terms of collaboration, though collaborative activities are often incorporated in
online education (Dillon, Dworkin, Gengler & Olson, 2008; Hauck, 2006; Heale,
Gorham & Fournier, 2010; Rovai, Wighting & Lie, 2005). Thompson and Ku
(2006) and Hathom and Ingram (2002) suggest that quality online collaboration

consists of participation (Zafeiriou, Nunes & Ford, 2001), interdependence (Johnson, Johnson & Smith, 1998), synthesis of information (Kaye, 1992) and independence (Laffey, Tupper, Musser & Wedman, 1998). Thompson and Ku propose that participation consists of individual contributions to problem solving, interdependence consists of actively responding to group members through interactions, synthesis of information "requires the product of collaboration to reflect the input of every group member," (p. 362), and independence requires that the collaborative group be independent of the instructor.

General Best Practices

Despite the large number of options available when it comes to professional development, general best practices should always be incorporated into professional development for educators. For example, McCabe (2008) suggests that effective teacher preparation involves promoting the success of practicing teachers, supporting new teachers through discussions and modeling, and respecting the ideas, opinions, and experiences of all teachers. In addition, teachers must be treated as respected professionals whose specialized skills and knowledge are valued by fellow teachers, students, and administrators (McCabe). If teachers feel positive about professional development, and themselves, they will be more likely to positively affect students, as student learning is positively affected by adult professional learning (Eaker & Keating, 2009). McCabe (2008) also reports that teacher preparation is "full of collaboration, cooperation, and discussion, leading to extremely positive collegial relationship between teachers, positively impacting their views about their profession," (p. 115-116). Research

50

indicates that professional development that allows teachers to reflect on their own beliefs through discussion with peers, consider alternative practices and beliefs, observe and discuss the impact these practices have on students, and implement new practices over time, may facilitate necessary change (Hughes, Kerr & Ooms, 2005). Furthermore, successful teacher preparation must be ongoing, and involve practice (McCabe, 2008).

Professional Development for Working with Students with Special Needs

Teachers today face a variety challenges, and one of their most challenging tasks is to meet the needs of a very diverse group of students, including those with special needs (Jenkins & Yoshimura, 2010). Frey (2009) suggests that the field of special education is very demanding and challenging, with data from most states reporting a lack of qualified special education teachers. He goes on to report that many teaching positions in special education are filled by unqualified teachers, or teachers on an emergency or temporary special education certification, creating a need for effective professional development at the very least. NCLB mandates that professional development opportunities, "provide training in how to teach and address the needs of students with different learning styles, particularly students with disabilities, students with special learning needs (including students who are gifted and talented), and students with limited English proficiency," (NCLB, 2002). Jenkins and Yoshimura (2010) share a story of a special education teacher who quickly becomes a special education resource for her general education colleagues due to increases in the population of students with special needs in the general education classroom. Her

general education colleagues report a lack of training and support, claiming that 'one-shot in-services' (Hochberg & Desimone, 2010) have been ineffective. This story is all too common in the field of special education. Not only are many general education teachers underprepared to meet the diverse needs of their students, but often, special educators and other professionals who work with students with special needs are underprepared as well.

Professional Development in the Area of Autism

According to Kraemer, Cook, Browning-Wright, Mayer, and Wallace (2008), one of the major issues in special education today is how to work with children with behavior problems, including autism. Teachers who work with children with behavior problems such as those that can be brought on by autism are often undertrained, contributing to low teacher retention and high burnout rate (Hastings & Brown, 2002). The National Research Council (2001) reports that even if teachers are certified in special education, most still receive little to no formal training in evidence-based practices for children with autism, though the need for teachers with strong skills and knowledge in the education of children with autism is essential (McCabe, 2008). Much of the current literature states that non-categorized special education certification programs, as well as general education programs, do not prepare teachers with the specialized knowledge necessary to effectively work with children with autism (McCabe, 2008). Like education in general, various methods exist for training teachers to work with children with special needs, and autism in particular. Rather than short-term workshops, extensive in-service training involving professionals from various

backgrounds (e.g. speech, psychology, etc.) is recommended to enhance skills in working with children with autism (McCabe, 2008).

Just as in professional development in any area of education, options for providing professional development to those who educate children with autism are plentiful. At the Autism Institute in the People's Republic of China, successful professional development was made possible when staff relationships involved equality, respect, and understanding, the professionals involved had comparable experiential backgrounds, and they were seen as uniquely qualified professionals (McCabe, 2008). In addition, relationships within professional development involved dialogue, reflection, support and challenge, and all of the teachers reported that they appreciated the opportunity to ask questions, share ideas, and share suggestions (McCabe).

Conclusions for Professional Development

Professional development in one form or another is essential to the successful growth of employees, and work sites in general, so that stagnation does not occur. As our nation and world evolve, so must businesses. With high stakes accountability prevalent today, including the desire to "produce" knowledgeable children prepared for the real world, the field of education can almost be considered a business in its own right. Businesses that wish to stay competitive and change along with changing times must be willing to continuously provide their employees with the knowledge and skills to make those changes. The right types of professional development can make this happen. Research has been and continues to be conducted to help businesses, including the field of education,

determine what types of professional development are most effective for their employees, and the ultimate success of their company. From brief workshops after a day's work, to a two-day weekend conference, to mandatory online modules, to ongoing professional learning communities, a wide variety of options exist when it comes to continuing education for employees.

The success of professional development for teachers can be measured by teacher feedback, student success, and/or overall school and district improvement. General and special education teachers alike have reported the most satisfaction when they learn content that can be readily and easily applied, and that is relevant to their teaching practices. Ongoing professional development is essential to keep teachers confident and able when it comes to content knowledge and research-based practices for working with various populations of students, including students with special needs. Due to its rapidly increasing prevalence, autism is one area of special education that is constantly gaining new information and methodologies based on research. These research-based practices must be disseminated to educators, including special educators, general educators, therapists, psychologists, and anyone else who works with children with autism if they are to be implemented, and implemented effectively. Furthermore, ongoing reflection and sharing amongst educators may assist with positivity and persistence with implementation in an area where many teachers burnout quickly. Professional development that accommodates these aspects, while at the same time being relevant and directly applicable to teaching practices, may be most beneficial.

In addition to a variety of options when it comes to providing professional development, online instruction or a combination of online and face-to-face instruction (hybrid) is one of the most rapidly increasing ways to accommodate educators, allowing them flexibility and convenience when it comes to learning, the ability to repeatedly view information, the opportunity to share ideas and ask questions, and outlets to reflect on and discuss their own practices and the practices of others. Further research on the effectiveness of online and hybrid professional development for educating educators about autism, may help to refine methods, and create the most effective professional development opportunities possible. Not only does this have the potential to make educators feel confident and able, hopefully easing the burnout rate especially amongst special educators, but it also has great potential to make a positive impact on students, which is the ultimate goal.

Summary

The literature revealed the following trends, which provided a basis for the purpose of this study:

- Educators of children with special needs, including autism, often lack the necessary knowledge for educating their students using evidence-based practices (Frey, 2009; Helps, Newson-Davis, & Callias, 1999; McCabe, 2008; Kraemer, Cook, Browning-Wright, Mayer, & Wallace, 2008; Lerman, Vorndran, Addison, & Kuhn, 2004; Lang & Fox, 2004).

- Current research is increasingly showing a link between professional development and both student achievement and school reform (Kesson &

Henderson, 2010), revealing an increased need for effective professional

development (Fishman, Marx, Best, & Tal, 2003; Hochberg & Desimone,

2010; Lieberman & Pointer Mace, 2008; Runhaar, Sanders, & Yang,

2010; Duncan-Howell, 2010; Mesler, Parise & Spillane, 2010).

- Various professional development strategies exist in the field of education

  (Eaker & Keating, 2009; Blanton, 2009; Killeavy & Moloney, 2008; Lang

  & Fox, 2004).

- With advancements in and increasing availability of technology, online

  instruction is progressively being seen as an effective method for

  educational environments (Kishore, Tabrizi, Ozan, Aziz & Wuensch,

  2009; Pucel & Stertz, 2005; Duncan-Howell, 2010; Killeavy & Moloney,

  2008; Cicco, 2009).

- Online instruction incorporates flexibility, accommodates for different

  learning styles and needs, provides rich collaboration and reflection

  opportunities, and allows teachers to interact, learn and access knowledge

  and resources all within a common social space (Blanton, 2009; Hunter,

  2002; Duncan-Howell, 2010; Leask & Younie, 2001).

- Further research is needed to assess the effectiveness of online instruction

  as a strategy for professional development in the field of education

  (Donovant, 2009; Koroghlanian & Brinkerhoff, 2007; Pucell & Stertz,

  2005; Frey, 2009; Lim, Kim, Chen & Ryder, 2008; Yuen & Ma, 2008).

- Results of the effectiveness of online versus face-to-face instruction are mixed (Dillon, Dworkin, Gengler & Olson, 2008; Hauck, 2006; Heale, Gorham & Fournier, 2010; Rovai, Wighting & Lie, 2005).

Chapter 3

METHODOLOGY

This chapter details the methodology used in this study, emphasizing development and implementation of the study and data collection and analysis. It also describes the evolution of the methodology, which changed shape as the study progressed. Results and discussion are found in Chapter 4.

The Research Questions

The review of literature revealed gaps in research in the area of professional development for educators of students with autism. Based on the review of literature, the problem as experienced by the researcher, and previous studies (McCoy, Gehrke, & Bruening, 2009; Bruening, 2010), the research questions for this study were developed in an attempt to determine the most effective way to conduct professional development in the area of autism and analyze specific factors that may increase or decrease effectiveness. The research questions included the following:

Question 1: In what ways does format delivery, face-to-face or online, of a professional development course in the area of autism impact the quality of collaborative problem solving for teachers?

Question 2: How did educators' attitudes toward using technology as a means of collaboration change as a result of participating in face-to-face or online delivery formats in a professional development course in the area of autism?

The Research Context

The professional development for the current study was offered in a southwest public school district, in February and March of 2011. The suburban, K-12 school district in which the study took place, consists of 39, 316 students (2010 – 2011 school year) receiving general and/or special education services. During the same school year, 29.4% of these students qualified for free or reduced lunch. Of students enrolled in the school district during the 2010 – 2011 school year, 57.1% of students were white, 6.7% black, 25.8% Hispanic, 8.5% Asian, and 1.9% other. The school district provides special education services to approximately 4,500 students, ages 3-22, diagnosed with a variety of disabilities including autism (National Alliance for Public Charter Schools Dashboard, http://dashboard.publiccharters.org/dashboard/students/page/overview/year/2011).

The five-week long, fifteen-hour course, titled "Autism and Adaptations," was developed by the school district's Director of Pupil Personnel based on the 2009 study by McCoy, Gehrke & Bruening that identified topics teachers felt were critical in providing appropriate services to students with autism spectrum disorders (ASD) including high functioning autism (HFA) and Asperger's Syndrome (AS). Topics and possible methods of professional development were ascertained through a survey and focus group interview. Appendices A and B present information from the 2009 study, including a description of survey participants and a summary of the information gathered from the focus group interview.

Based on information regarding professional development format gathered from the 2009 study, an asynchronous, online environment was created and utilized for a portion of the students in an attempt to determine teacher receptivity and knowledge growth after using technology. The first professional development course to be developed from the 2009 study was offered in the spring of 2010, and offered three formats to participants, including face-to-face, online, and hybrid (a combination of face-to-face and online components). Course content and collaboration opportunities were delivered in a strictly face-to-face format for Classes One, Two and Five, while Classes Three and Four incorporated technology in either a hybrid (face-to-face content delivery, online collaboration) or strictly online (online content delivery and collaboration) format.

The professional development course offered in the spring of 2010 produced data for a study which attempted to determine effective in-service formats for teachers who are responsible for the education of students with autism spectrum disorders (ASD), including high-functioning autism (HFA) and Asperger's Syndrome (AS). This study used a mixed-methods design to analyze data, and results indicated that educators improved their knowledge base regarding characteristics of and adaptations for autism in both formats, and that participants found the online format effective and personally satisfactory (Bruening, 2010).

The results of the previous studies provided a framework for the professional development course employed in the current study, which was offered in the spring of 2011 in the same school district, with new participants.

Course content remained the same, but format delivery and portions of the

participant assignments were slightly modified.   Course format was modified to

include strictly face-to-face and online formats rather than including a hybrid

section of the course, and participants were exposed to a specific format over a

longer period of time. Wording was slightly modified in requirements of the

weekly reflection rubric and questions on the pre- and post-surveys, to reflect the

needs of the current study in answering the research questions.

The General Research Perspective

Participants in the professional development course for the current study

were asked to produce written statements throughout the course, which were used

in data analysis. Qualitative analysis was used to analyze writing samples,

including weekly reflections, and comments regarding attitudes about course

format and collaboration.

The theoretical perspective underpinning the decision to use qualitative

analysis was the notion that themes may be found in participant writings that

would provide information as to the way the participants perceived their

experiences with the course. The specific methodology in this study was chosen

as a way to make sense of and interpret participants' written statements, in an

attempt to determine if one professional development course format was more

effective than another. In particular, constant comparison (Miles & Huberman,

2004; Glaser & Strauss, 1967) and classical content analysis (Leech &

Onwuegbuzie, 2007) were used to analyze 113 weekly reflections (twenty-three

reflections times five weeks, minus two missing reflections) and comments about

participant attitudes across twenty-three pre-surveys and twenty-three post surveys. The third writing statement, discussion board posts, was not used in data analysis, as reflections included necessary information about the discussions and their outcomes. Only the online group used the discussion board, and recording and transcribing the discussions of each small group in the face-to-face section of the course, was beyond the scope of this study.

As a normal course of events within the professional development course, pre-/post-tests were given, assessing content knowledge in the area of autism to assure equitable knowledge base between the groups. Results indicated that the face-to-face and online groups began the course with equitable content knowledge about autism, with an average raw score of 15.7 correct for each group, out of a total of 23 questions (see Appendix C).

The Research Participants

The course was advertised via the school district website to district staff who have, had, or will have students with high functioning autism in their classrooms/programs. Twenty-three educators in the school district voluntarily participated in the course. Ten participants were assigned to the online group, and thirteen participants were assigned to the face-to-face group. Educators who participated in the professional development course did so by choice, and had the opportunity to earn one credit toward salary advancement or a paid stipend ($300 for off-contract attendance). Participants in the study were presented with information about autism to increase content knowledge, and for

discussion and reflection, they were asked to present situations or challenges they faced when working with students diagnosed with autism.

All participants worked with one or more students with autism during the 2010 – 2011 school year, previously worked with one or more students with autism, or would likely be working with one or more students with autism in the future. Participants worked with these students in either the general education classroom, resource classroom, or self-contained special education classroom, and in various grade levels. One participant in the group was a school counselor. Current teaching positions, number of years teaching, and number of years working with children with autism varied amongst participants (see Appendix J). All participants in the course were female.

The face-to-face group consisted of zero special educators, eleven general educators, one school counselor, and one teacher who taught both general and special education. Eight educators taught at the elementary level, two at the junior high level, one at the high school level, one taught all grade levels (K-12), and the grade levels of the school counselor were not specified. The online group consisted of five special educators and five general educators, and contained six elementary educators, two at the junior high level, zero at the high school level, and two special education teachers who did not specify grade level. The mean number of years teaching in the face-to-face group was 14.5 years, and 7.5 years in the online group, while the range was similar at 23 years and 22 years, respectively. Both the face-to-face and online groups were very similar in the number of years working with children with autism, with an average of 7.2 years

and a 25 year range in the face-to-face group, and 7.7 years and a 23 year range in the online group.

Despite the fact that the online group had more special educators and slightly more experience working with children with autism, they had seven less years of teaching experience on average, and their scores on the content knowledge pre-test were identical to the scores of the face-to-face group. Based on the information gathered, both groups started and ended the course with knowledge of and experience with autism commensurate to one another.

Instruments Used in Data Collection

Two instruments were used in the collection of data for this study, participants' weekly written reflections, and the survey portion of the pre- and post-test which included a section on attitudes toward collaboration and course format.

Weekly written reflections.

To receive credit for the professional development course, participants were required to participate in group discussions each week, and write a one to two page reflection containing specific elements including describing a specific challenge discussed in the group, an explanation of how the discussion helped the participant, any contributions the participant provided to the discussion, and how course content and materials were or were not useful. See Appendix D for the full rubric and procedures for the weekly written reflections. All reflections were sent to the researcher via e-mail.

Pre- and post-tests/surveys.

Participants were asked to complete a pre- and post-test/survey on the first and last days of the course. Participants in both groups were asked to come to a district office building to do so, regardless of the group they were assigned to. The tests/surveys were identical for both the pre- and post- assessments. Part one of the test/survey contained 23 multiple choice questions to assess content knowledge about autism, each of which offered four answer choices. Part two, the Attitudes section, contained 17 questions or statements that participants were asked to briefly comment on. See Appendix E for the full pre-/post-test/survey.

Procedure

Participant recruitment.

Participants in the professional development course were recruited through the school district website, and/or word of mouth. Through the website, they registered for the course, and then attended on their own accord. Based on course content and the nature of programming in the school district, the intended audience for the course was general and special educators of students with high-functioning ASD or AS. However, any teacher or service provider who currently or previously worked with any student(s) diagnosed with autism, or would in the future, was welcome. The participants were informed that the course and course requirements were part of a research and development project. See Appendix F for the school district website's course advertisement.

Professional development course.

All content was delivered through instructor-created PowerPoint presentations and related instructor-selected articles. The PowerPoint presentations contained information on characteristics of ASD/HFA/AS, adaptations for communication, adaptations for social skills and social interactions, adaptations for sensory needs, and information on Individualized Education Programs (IEP) for students with autism. In the face-to-face group, PowerPoint presentations were presented by the instructor, using an instructor-developed script. For the online group, the Week One PowerPoint presentation was presented by the instructor, but all subsequent PowerPoint presentations were posted online, and participants in the online group were able to access these at their convenience. However, they were unable to access the instructor-developed script. PowerPoint presentations for both groups were supplemented by professional journal or other articles gathered by the instructor that related to the content for the week. See Appendix G for a list of articles offered in the course. Participants were offered a choice of two or more articles to read each week, and were required to read at least one before the next week's class.

In addition to learning content, participants were required to participate in a group discussion. The discussion requirements consisted of one or more participants presenting a difficult situation they currently faced or faced in the past, when working with a child or children with autism. For the purposes of the course, presenting a current situation was encouraged, so that colleagues could provide suggestions for intervention, and the suggestions could be implemented.

For the online version of the course, the Week One discussion was completed in class. All subsequent discussions were held online, using a free, open-source course management system called Moodle (http://moodle.org/), that was set up by the district technology specialists. On the Moodle, online participants were required to post a minimum of one challenge they faced per week, and were required to respond to at least one other colleague's challenge, providing suggestions for intervention as their ability allowed. See Appendix D for specific discussion board requirements. Face-to-face participants were given approximately one hour (of three hours) of each class meeting to get into their small group, discuss challenges faced, and attempt to collaborate by giving suggestions for intervention as their ability allowed. Participants were encouraged to let each group member present a situation if possible, and/or contribute to the group by providing suggestions for intervention.

Students were then asked to produce a one to two page written reflection each week, including four specific elements based on the group discussion. These elements included describing a specific challenge discussed in the group, an explanation of how the discussion helped the writer, any contributions the writer provided to the discussion, and how course content and materials were or were not useful to the discussion and/or the writer. Regardless of the course format to which the participants were assigned, all participants were required to e-mail the reflections to the researcher for ease of transfer and to determine if the reflections included the required elements. The researcher read each reflection as it was sent, keeping the reflection as data or returning it to the writer with feedback as to

which elements were missing. If one or more elements were missing, the writer was asked to include the element(s) and resubmit the reflection to the researcher. No participants were asked to resubmit any particular reflection more than one time. Once the reflection was resubmitted, it was kept by the instructor as data.

Week one. For Week One, all participants met face-to-face at the class site for three hours. After completing the pre-test/survey, the instructor assigned groups and discussed course procedures, including how to access Moodle for the online group.

Participants were randomly assigned to either the online or face-to-face group, by choosing their assigned group out of a hat. Two participants who chose the online group had situations that made the face-to-face format more feasible for them, so the instructor allowed them to switch to the face-to-face group, making numbers uneven, but making it more likely that the participants would continue with the course. Eleven participants were originally assigned to the face-to-face group, and twelve were assigned to the online group. Two participants switched groups, leaving thirteen in the face-to-face format, and ten in the online format. In the face-to-face group, participants were divided into small groups of three to four participants, which were assigned as discussion groups for the entire course. These small groups included Subgroup One (four participants), Subgroup Two (three participants), Subgroup Three (three participants) and Subgroup Four (three participants). In the online group, participants were divided into groups for Week One (when they collaborated face-to-face), but collaborated as one large group for Weeks Two – Five.

Weeks two - four. During Weeks Two - Four, the online group met only on the Moodle site. They were required to access course content on Moodle, including the PowerPoint presentations and related articles, and were required to post to the discussion board, before the beginning of the next week. All materials posted by the instructor were kept hidden (from participant view) until the appropriate week, so that the online group did not have an advantage in accessing materials earlier. The face-to-face group met for each class at the same district site, one day of each of the five weeks for three hours each, two of which were spent on course content, and one of which was spent in discussion groups. All participants were required to e-mail the researcher their weekly reflection before the beginning of the next week.

Week five. Course content and discussion for the online group were still presented in Moodle during Week Five. However, participants were required to come to the class site at some time during the three hours of the last face-to-face class meeting to take the post-test/survey, for the purposes of the current study and as part of the school district's requirements for face-to-face hours for a professional development course. The face-to-face group met and continued with the same procedure as previous weeks, also completing the post-test/survey. All post-tests/surveys were taken by hand, turned into the instructor, and later turned into the researcher as data.

Data Analysis

Weekly written reflections.

After all weekly written reflections were submitted or resubmitted with additional elements as necessary, they were organized by format and by week. All reflection documents were uploaded into a qualitative data analysis software program for coding and analysis. Week One reflections from both the online and face-to-face groups were re-read (all reflections were previously read by the researcher upon receipt from the participant), and codes were induced from the data that represented information about collaboration. Six major codes emerged from the data including seeking assistance or collaboration in reflection, contributions/collaboration, implementation of suggestions, time efficiency, professed efficacy of collaboration and course materials. Thirty-one sub codes followed the major codes. See Appendix H for a list of initially induced codes.

To determine code plausibility, the list of codes was reviewed by the research committee, wherein it was suggested that an additional code be added (Outlier/Reflection Does Not Address Necessary Information), and that all Week One reflections be coded using this system to further determine plausibility. Each chunk of data was compared (Miles & Huberman, 1994) to the initial codes, and codes were revised again based on the emergence of new themes that fell outside the boundaries of existing codes. A second code system was presented to the researcher's committee, including seven major codes and fifty-four sub codes. See Appendix I for the complete code system.

The codes and sub codes that emerged from the data were then further organized within the four major themes found in the Weekly Written Reflection rubric including (1) a description of the writer's situation, (2) effectiveness of discussion and/or suggestions, (3) contributions/collaboration for a colleague's situation, and (4) course content. Duplicate concepts were eliminated, and twenty-three sub codes emerged within the four overarching categories.

The coding system was approved by the research committee and an initial fidelity check was completed by the researcher and another committee member to determine plausibility of codes and fidelity in coding. The researcher and committee member each coded the same reflection using the third set of codes, and results were compared. Reliability was 100% through discussion (e.g. any differences in coding were discussed and agreements were made). Specificity was added to four code descriptions, and coding for presented situations was determined to only be completed when the writer presented her own situation, to avoid the possibility of presented situations being coded more than once (e.g. more than one writer might write about the same colleague's situation). The final coding system is presented in Table 1.

Table 1

Code System for Weekly Written Reflections

1 Description of Writer's Situation (If Presented)	2 Effectiveness of Discussion and/or Suggestions for Writer's Situation or Overall Knowledge	3 Contributions/ Collaborations for a Colleague's Situation	4 Course Content: Materials/Info. Presented by Instructor

1.1) Writer presented her own situation to colleagues for discussion.
 	
  a) Writer's situation was academic.
 	
  b) Writer's situation was behavioral.
 	
  c) Writer's situation was social.
 	
  d) Writer's situation was sensory.
 	
  e) Writer's situation was speech/ language.
 	
  f) Writer's situation was other.
 	
1.2) Discussion/ collaboration revolved around same presented situation as any prior week.
 	
1.3) Other (Note additional category or outlier.)
	2.1) Writer professed discussion/ collaboration helped her in some way.
	
	2.2) Writer professed discussion/collaboration did not help her.
	
	2.3) Writer professed not much/enough time to discuss/collaborate.
	
	2.4) Suggestion was given to writer for the situation she brought up to group.
	
	2.5) Suggestions were not given to writer for the situation she brought up to group.
	
	2.6) Suggestions given to writer were implemented.
	
	  a) Implement-ed suggestions were effective.
	
	  b) Implement-ed suggestions were ineffective.
	
	2.7) Suggestions given to writer were
		3.1) Writer provided contribution(s) to colleague(s).
		
		3.2) Writer did not provide contribution(s) to colleague(s) even though a colleague's situation was brought up.
		
		3.3)Members of the group (writer or others) experienced similar situation(s).
		
		3.4) Other (Note additional category or outlier.)
		
		3.10) Writer did not reference another colleague's situation.
			4.1) Materials/info. were useful in collaborative discussion.
			
			4.2) Materials/info. were not useful in collaborative discussion.
			
			4.3) Materials/info. were useful to writer in some way.
			
			4.4) Materials/info. were not useful to writer.
			
			4.5) Other (Note additional category or outlier.)
			
			4.10) Writer did not reference materials/course content, etc.

1.10) Writer did not present her own situation for discussion.	not implemented. 2.8) Suggestions may be implemented/writer wants to implement them in the future. 2.9) Other (Note additional category or outlier.) 2.10) Writer did not reference collaborative discussion in any way.		

A second fidelity check was completed using the final coding system to determine plausibility of codes and inter-rater agreement. The researcher and one other committee member each coded a second Week One reflection, and were in 100% agreement as to codes found. A third fidelity check was completed by the researcher and two other committee members. An additional Week One reflection was coded and specific codes and representative text were discussed and agreed upon by the group. Minor revisions were made to the coding system for purposes of clarity and ease of analysis, and the group determined that codes were plausible and that a more in-depth fidelity check could be conducted. One reflection from each of Weeks Two-Five was coded by the researcher and one other committee member. Fidelity was over 80% for all reflections, and was increased to 100% for all reflections after discussion.

Upon completion of the four initial fidelity checks, the researcher coded all reflections using the qualitative data analysis software program, MaxQDA. The number of times each code appeared was calculated, and specific text that

was representative of particular codes was analyzed for meaning across groups (online or face-to-face), weeks, and/or the same participant by week depending on the type of analysis that best answered the research question for a particular code.

Attitudes surveys.

The second research question addressed changes in attitudes about technology as a result of participating in either the online or face-to-face group. Data from the comment portion of the pre-/post-survey was qualitatively analyzed using constant comparison (Miles & Huberman, 1994). The emergence of categories found in comments was semi-formulaic, in that the nature of the questions asked produced comments that could either be categorized as having a positive attitude about the content in the question, a negative attitude about the content in the question, or a neutral attitude about the content in the question. No further categories were induced as none were considered necessary to analyze further in order to answer the research question.

Text was categorized and compared for each question, across pre- and post- surveys and online and face-to-face groups. The number of times each category (positive, negative or neutral) was represented was calculated, and changes in positive attitudes from pre- to post-survey were reported.

A fidelity check was completed by sharing the text and related interpretation with the researcher's committee to determine plausibility of text within categories. Conclusions drawn from analysis and categorization of the text were shared with the researcher's committee to determine reasonableness.

Summary of the Methodology

      This study utilized qualitative analysis to gather information on the quality of collaboration in face-to-face versus online formats in a professional development course in the area of autism offered to educators in a public, K-12 southwest school district. Additionally, information was gathered regarding changes in participant attitudes about technology as a means of collaboration after participating in one format or the other. Text from weekly written reflections and comments on attitudes surveys was coded and analyzed for patterns and trends across groups, weeks, and/or participants. The following chapter presents findings based on analysis of all data collected.

Chapter 4

RESULTS

For both research questions, data were analyzed qualitatively. Analysis was based on written text of participants, both in the reflections and the pre- and post-surveys. MaxQDA, a qualitative data analysis software program, was used for the reflections as a method of concisely categorizing text by code. This particular software program also offers numerical categorizing by tracking the number of times each code was found across any given group. Numerical data for both research questions are included in the results of this study, in order to discern meaningful patterns and changes within each code. Calculated percentages are based on the number of participants responding in each group.

Question 1 – Quality of Collaboration in Face-to-Face versus Online Formats

Participants' written reflections were analyzed in an attempt to answer Question 1: In what ways does format delivery, face-to-face or online, of a professional development course in the area of autism impact the quality of collaborative problem solving for teachers? Numerical data are presented, and specific quotes from reflections are included where they serve as examples of coded text for specific categories. All numerical data for reflections are found in Appendix K. Results associated with the most salient data for answering the research question are found in Figures 1 – 12 and related narratives. During Weeks Three and Five, only nine participants turned in written reflections in the online group.

For the purposes of this study, the indicators used to establish quality, as outlined in Chapter 2, include participation, interdependence, synthesis of information (Thompson & Ku, 2006; Hathom and Ingram, 2002; Zafeiriou, Nunes & Ford, 2001; Johnson, Johnson & Smith, 1998; Kaye, 1992; Laffey, Tupper, Musser & Wedman, 1998), dialogue, decision-making, action and evaluation (Gajda & Koliba, 2008). These indicators were used as general guides when organizing the content of the written reflections according to the following codes: (1) presenting situations for discussion, (2) commenting on the effectiveness of that discussion, (3) noting contributions made to other colleagues, and (4) commenting on materials presented by the instructor. Findings as related to quality indicators are discussed in detail in Chapter 5.

Code 1 – Description of writer's situation (if presented).

Code 1 examined situations participants presented to the group for discussion and problem-solving. Categories within this included presenting the situation to colleagues and the type of situation presented (1.1), presenting the same situation as a prior week (1.2), and not presenting a situation for discussion during that week (1.10). Figures 1 and 2 report the number of participants who presented their own situations, did not present their own situations, or for whom a related comment was either not present or not clear. Also examined is the number of times a situation was presented in more than one week. The number of incidences and the percent of total responses for each of the categories and subcategories in Code 1 are found in Appendix K.

77
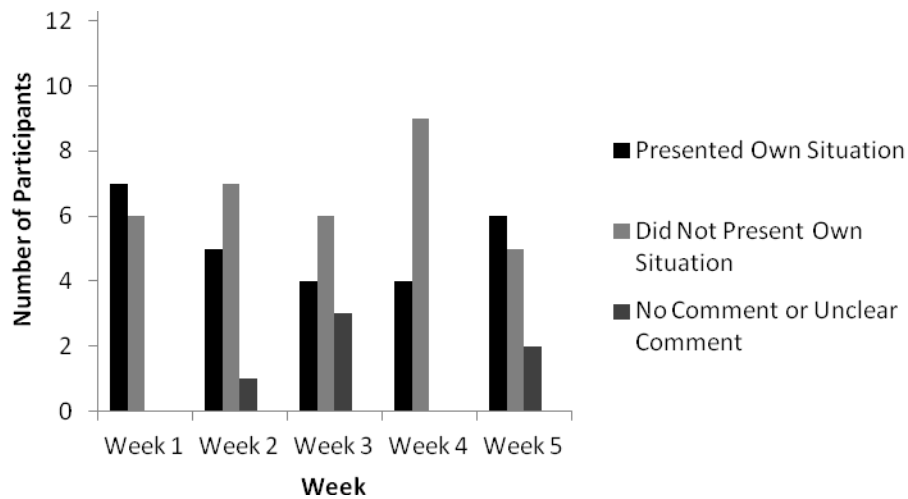
Figure 1. Number of participants who presented their own situations in the face-to-face group.

On average, 40% of participants presented a situation each week in the face-to-face group. A total of 26 situations were presented across weeks, with most situations related to behavioral challenges as evidenced by statements such as, "I shared about a student who is hyper-focused on guitar and has been having meltdowns whenever the lesson proceeds without guitar accompaniment," and "The challenge I brought up today to my teammates was a student who is on the Autism Spectrum in my music class who is impulsive and does not keep his hands to himself." The mean percentage of participants who did not present a situation each week in the face-to-face group was 51% and one participant did not present a situation in any week. Results indicate that on average, less than half of the participants presented their situations each week. The face-to-face group presented their own situations notably less than the online group.
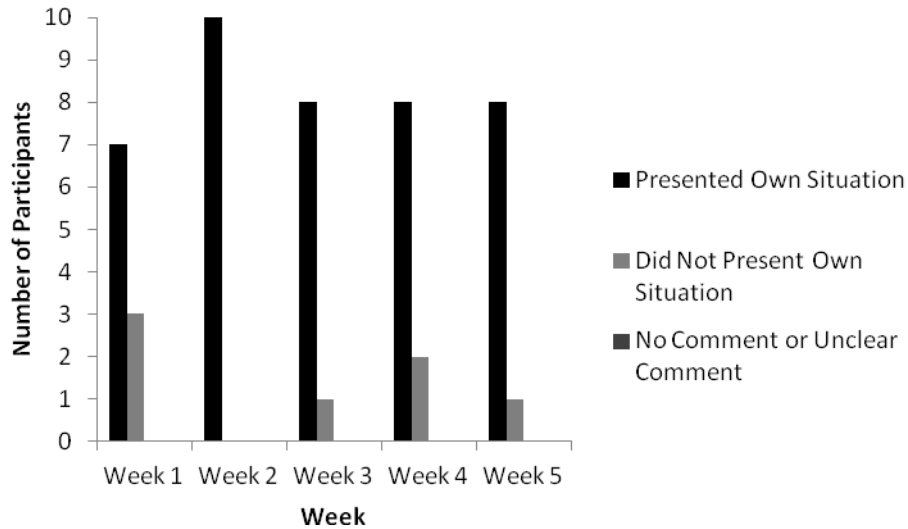
Figure 2. Number of participants who presented their own situations in the online group.

As reported in Figure 2, the online group saw better results than the face-to-face group for presenting their own situations, presenting 41 situations total, with the majority again being related to behavioral challenges, evidenced by statements such as, "(The student) leaves his seat to go and monitor (his peers') progress on the computer. He also often gets very upset if they are playing a game that he does not like," and "(My student) can be in a great mood and then all the sudden snap into a state of depression." Situations were presented by all 10 participants, though some participants presented more frequently than others. The mean percentage of participants presenting their own situations each week in the online group was 86%. A mean of 12% of participants did not present a situation each week in the online group. Results indicate that 80% or more participants presented their own situations each week when using the Moodle interface (Weeks Two – Five).

Same situation as a prior week. Comments in written reflections for

Weeks Two – Five were analyzed to determine if a situation was presented in

more than one week. In the face-to-face group, 11 presented situations were also

presented in a prior week, whereas this occurred only one time in the online

group. A mean of 21% of participants presented the same situation as a prior

week in the face-to-face group each week, and a mean of 3% of participants did

so in the online group (see Appendix K). Text evidencing the same situation was

presented included statements such as, "Our discussion tonight was built upon our

discussion from last week," and "This week, I brought up again my student with

Asperger's Syndrome in Honors German 3."

Code 2 - Effectiveness of discussion for writer's situation/knowledge.

Code 2 examined the effectiveness of the discussion for participants.

Categories in Code 2 included discussion did help writer's situation/knowledge

(2.1), discussion did not help writer's situation/knowledge (2.2), not enough time

to collaborate (2.3), suggestion was given to writer (2.4), suggestion was not

given to writer (2.5), suggestions were implemented (2.6), suggestions were not

implemented (2.7) and suggestions may be implemented (2.8). Figures 3 and 4

report the number of participants who found the discussion helpful, did not find

the discussion helpful, or for whom a related comment was either not present or

not clear. Figures 5 and 6 report the number of participants who received

suggestions, did not receive suggestions, or did not mention receiving

suggestions. Figures 7 and 8 report the number of participants, who implemented

suggestions, did not implement suggestions, or plan to implement suggestions.

80

Lack of time to collaborate is also examined. The number of incidences and the

percent of total responses for each of the categories and subcategories in Code 2

are found in Appendix K.
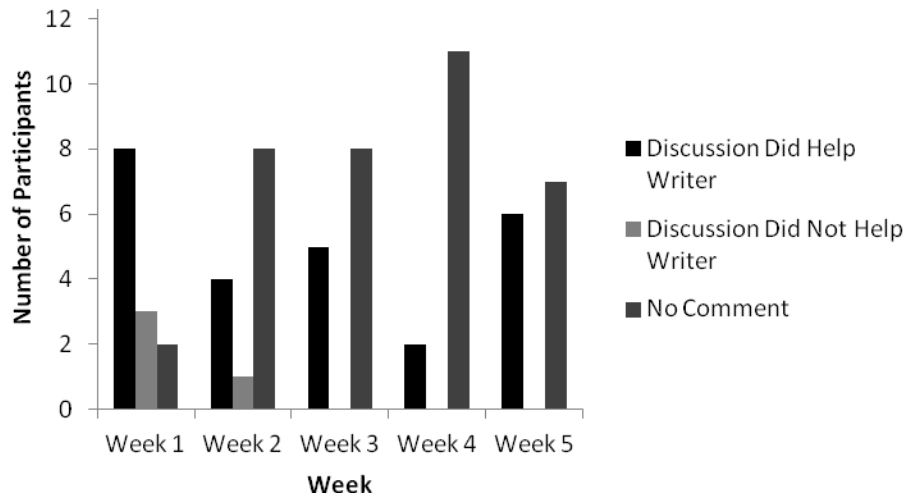
Figure 3. Number of participants who commented on helpfulness of discussion in the face-to-face group.

On average, 38% of participants reportedly found the discussion helpful each week. Helpfulness of the discussion was mentioned a total of 25 times by the face-to-face group across weeks, represented by statements such as, "Our discussion resulted in many great suggestions on how to intervene," and "Even though this child was not mine, I could apply some of these suggestions to help any child who is being bullied." In the face-to-face group, helpfulness of the discussion was mentioned by 10 of the 13 participants. Three participants never reported the discussion as being helpful in any week. Four participants mentioned not finding the discussion helpful across Weeks One and Two. No other mentions of the discussion not being helpful were found, resulting in an average of 6% of participants not finding the discussion helpful weekly. Many participants did not comment on the helpfulness of discussion at all in their written reflections.
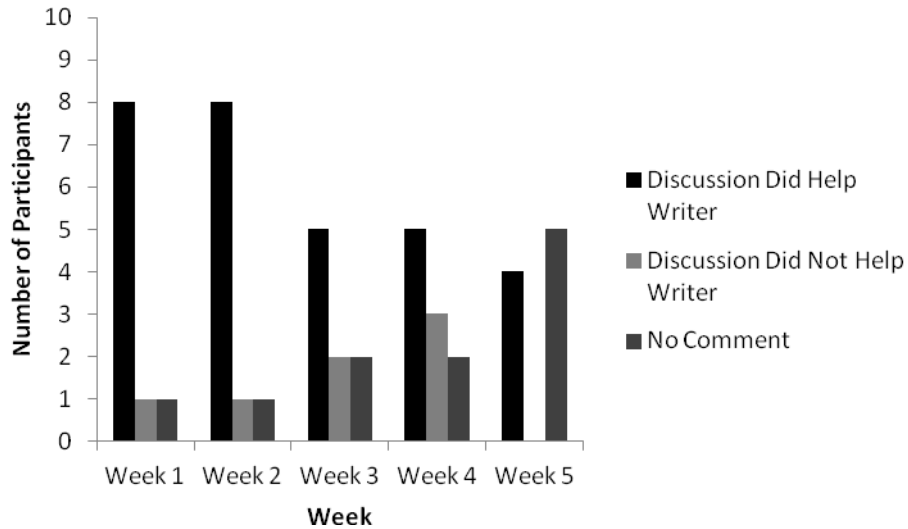
Figure 4. Number of participants who commented on helpfulness of discussion in the online group.

The online group found the discussion more helpful than the face-to-face group, mentioning this 30 times across weeks, making statements such as, "The discussion with my colleagues has helped a lot this week! They have given me great ideas which I plan to try with this student soon," and "This analogy helped me grasp the concept a lot better." All participants mentioned the helpfulness of the discussion at least one time. The mean percentage of participants who found the discussion helpful each week was 62%. Participants appeared to find the discussion more helpful initially, and then reported helpfulness gradually declined while reports of the discussion not being helpful increased for all weeks except Week Five. Percentage of participants not finding the discussion helpful was low across weeks, with a mean of 14% of participants reporting this weekly. More participants commented on the discussion's helpfulness or non-helpfulness in the online group, than they did in the face-to-face group.
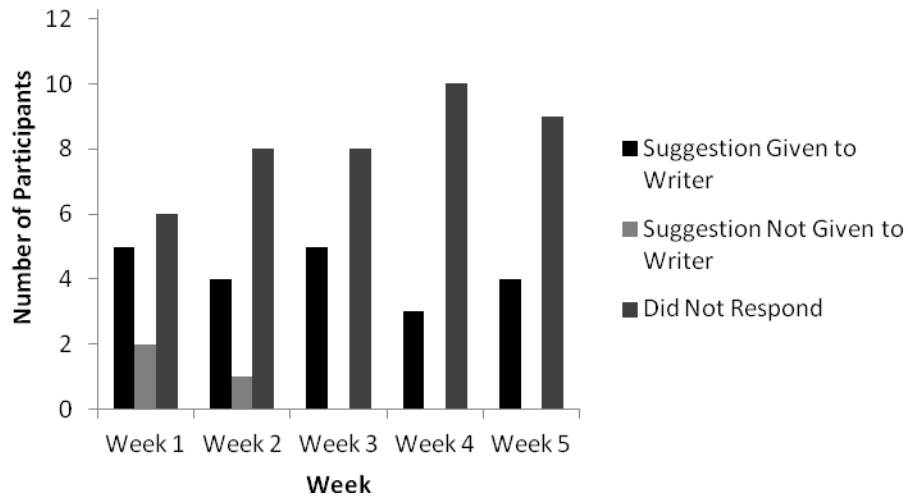
Figure 5. Number of participants given suggestions in the face-to-face group.

The face-to-face group reportedly received at least one suggestion for their situation 21 times across weeks as evidenced by statements such as, "Visual schedules were an idea, along with a 'first…then' picture board," and "My group suggested I use pictures cut out of magazines to show him what a happy vs. angry face looks like." Mean percentage of participants receiving a suggestion in the face-to-face group each week was 32%. Of the 13 participants in the face-to-face group, only 11 mentioned ever receiving suggestions. On average, 5% of participants reportedly did not receive suggestions for their presented situations each week. Patterns in this category were varied, both increasing and decreasing from week to week. No participants reported that they did not receive a suggestion during Weeks Three – Five and many participants did not comment on suggestions received.
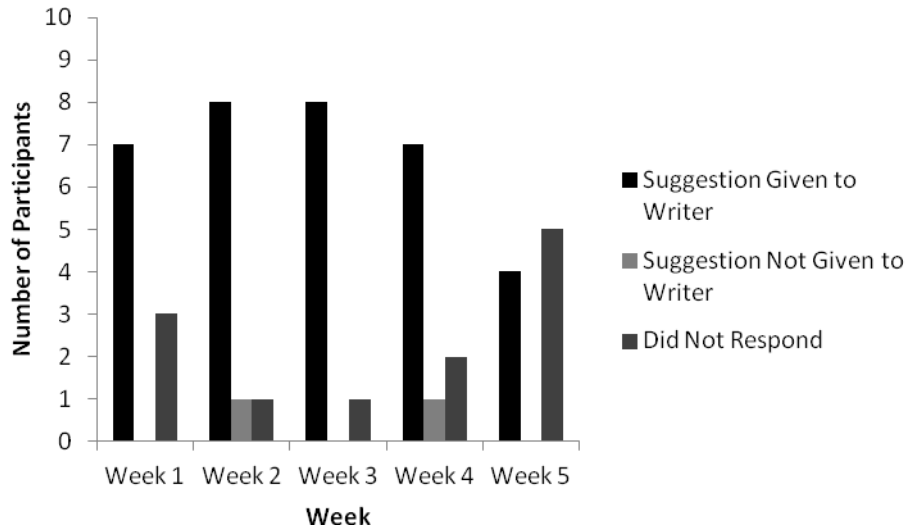
Figure 6. Number of participants given suggestions in the online group.

The online group reportedly received more suggestions overall for their presented situations than the face-to-face group. Participants reported receiving one or more suggestions for a presented situation 34 times across weeks, making statements such as, "One particular post gave a fabulous example of how to demonstrate to the other students equal vs. equity," and "In collaborating, I was given a suggestion to let the student chew gum if this incident keeps happening." In fact, all 10 participants reported receiving two or more suggestions during the course. The mean percentage of participants receiving suggestions for their presented situations each week was 71%. Though Week Five saw a major decrease in the number of participants receiving suggestions, the number of participants who did not report receiving or not receiving suggestions increased during this week. Only two participants mentioned not receiving suggestions for one of their presented situations, resulting in a mean of 4% of participants not

receiving suggestions each week overall. Similar to the face-to-face group,

numbers were very low overall for not receiving suggestions.
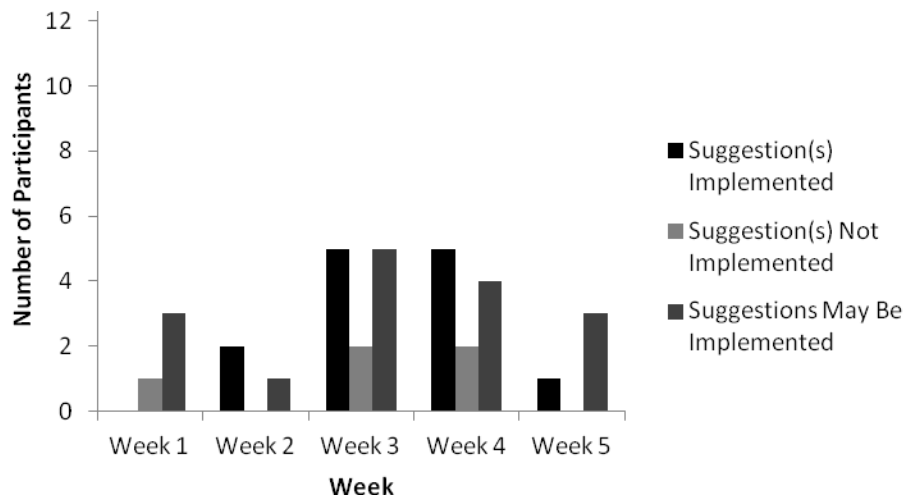
Figure 7. Participant implementation of suggestions in the face-to-face group.

Though numbers for implementation were low across both groups, the face-to-face group reported slightly more that they actually implemented suggestions, or that they did not implement suggestions. Participants implemented suggestions a total of 13 times across weeks, as evidenced by statements such as, "We decided that I would try the mirror idea. (My student) was a very reluctant participant," and "I used the technique of assigning parts of a story to each student in my class and let them 'rehearse' before we read our story aloud." A mean of 20% of participants implemented suggestions in the face-to-face group each week. Participants specifically mentioned not implementing suggestions a total of 5 times across weeks, represented by statements such as, "I was not able to try any of these suggestions, because (my student) didn't come to my room this week, due to testing in his LEP room." A mean of 8% of participants specifically mentioned not implementing suggestions weekly. Participants in the face-to-face group reported that they planned on implementing

suggestions 16 times, represented by statements such as, "I will try some of the recommended strategies in the 4th quarter, after break," and "I will definitely implement my group's suggestion next week in contacting his English teacher." A mean of 25% of participants reported plans to implement suggestions each week. All categories of implementation were highest during Weeks Three and Four.
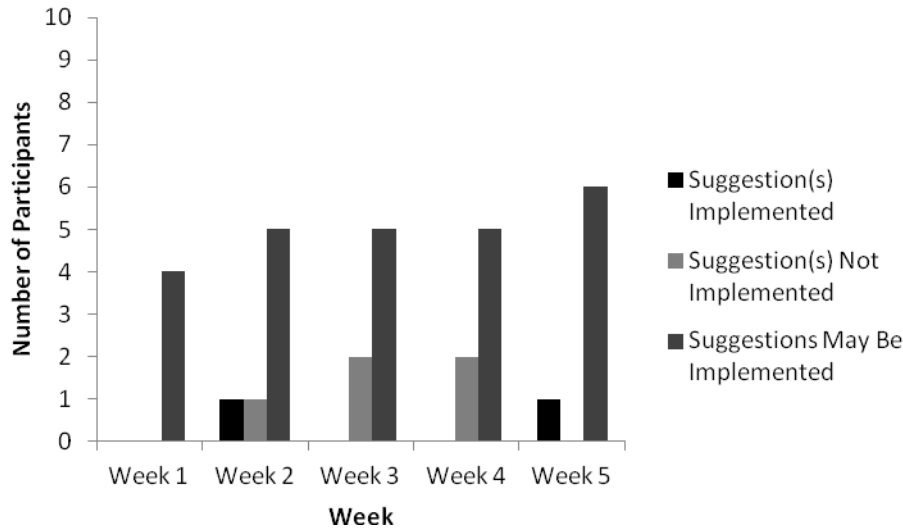
Figure 8. Participant implementation of suggestions in the online group.

Reported implementation of suggestions was very low in the online group, and even lower than the face-to-face group in this category. Across weeks, only two participants mentioned that they implemented suggestions, resulting in an average of 4% of participants weekly. Participants reported not implementing a suggestion a total of 5 times across weeks, making statements such as, "However, given that I teach in a self-contained classroom for students with more severe disabilities, it does not allow me the freedom of co-teaching in the regular education classroom," and "I agree that this would be a fantastic idea, however, he is a kindergarten student and we do not have a preschool on campus." A mean of 10% of participants reported not implementing suggestions each week. The number of participants who did not implement suggestions increased when the online group began to use the Moodle interface. However, no reports of not implementing suggestions were found during Week Five. The online group reported that they planned on implementing suggestions more than the face-to-

face group, and numbers in this category increased gradually across weeks. Participants reported that they planned on implementing suggestions 25 times across weeks, evidenced by statements such as, "I like this idea and plan on incorporating it into our daily routine and making it an IEP accommodation," and "One suggestion that I will definitely try is giving this student a PVC pipe to help (him) hear certain sounds when (he is) reading and/or vocalizing." An average of 53% of participants reportedly planned to implement suggestions weekly.

Having enough time to collaborate. Written reflections were analyzed to determine if participants mentioned a lack of time during any week (see Appendix K). Lack of time for collaboration was mentioned 12 times in the face-to-face group, represented by statements such as, "Collaboration with my classmates in the discussion that we held did not help me problem solve and intervene in my situation as we only had time to share the above scenario during our class time," and "No other issues were discussed as there was not sufficient class time." In the face-to-face group, a mean of 19% of participants reported a lack of time for collaboration each week. In the online group, lack of time was only reported by two participants in Week One, when the online group actually met face-to-face, resulting in a mean of 4% of participants reporting lack of time weekly. Lack of time was not reported at all for the online group when using the Moodle interface.

Code 3 – Contributions to colleague.

Code 3 examined contributions made by participants. Categories within Code 3 included writer did provide a contribution (3.1), writer did not provide a contribution (3.2), similar situations experienced by group members (3.3) and

colleague's situation not mentioned (3.10). Figures 9 and 10 report the number of

participants who provided contributions to their colleagues, did not provide

contributions to their colleagues, or for whom discussion about a colleague's

situation and related contributions was either not present or not clear. The

number of incidences and the percent of total responses for each of the categories

and subcategories in Code 3 are found in Appendix K.
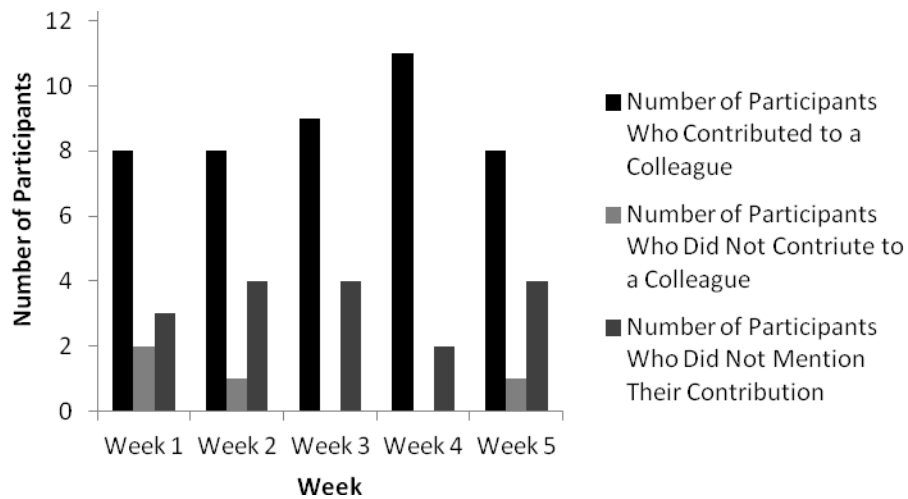
Figure 9. Number of participants who contributed to a colleague in the face-to-face group.

All participants in the face-to-face group contributed to a colleague at least one time across weeks, and the number of participants contributing to colleagues gradually increased for all weeks except Week Five. Participants mentioned contributing to a colleague a total of 44 times, making statements such as, "My contribution to my colleague was to have them look at a social story and then try to use that outside with a peer," and "My suggestion was to use a visual cue to show the student 'quiet mouth' when the teacher is lecturing." The mean percentage of participants who contributed to a colleague was 68% weekly. Contributions in the face-to-face group gradually increased through Week Four, and then decreased again during Week Five, never dropping below 62% of participants contributing. The number of participants who reportedly did not contribute to a colleague was low across weeks. Participants mentioned that they did not contribute to a colleague a total of 4 times, evidenced by statements such

as, "I was unable to contribute an idea, because I haven't worked with or learned very much (yet) about the autistic/Asperger's population." A mean of 9% of participants reported not contributing to a colleague weekly.
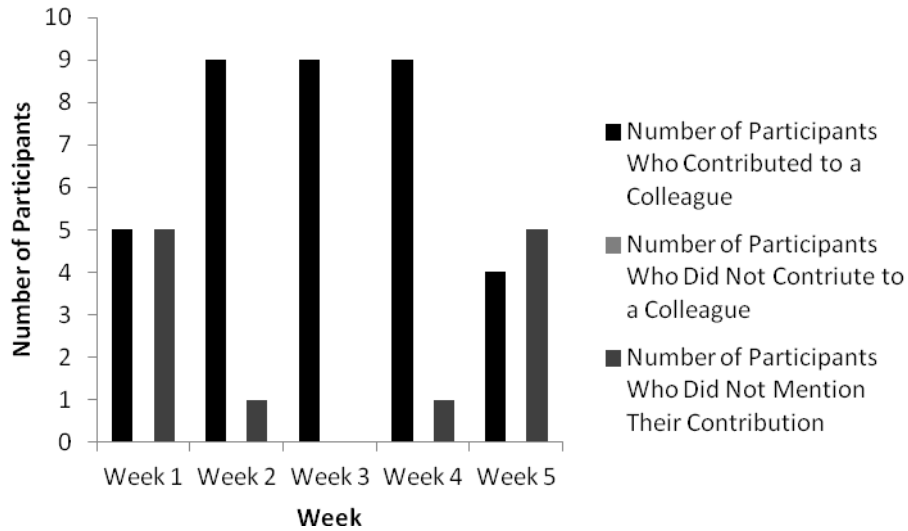
Figure 10. Number of participants who contributed to a colleague in the online group.

The online group saw more participants contributing to colleagues overall. All participants in the online group made at least one contribution, totaling 36 contributions across weeks, represented by statements such as, "I suggested that perhaps the student, if they arrived early, could have a ten minute 'study hall' before class," and "I suggested that the teacher(s) come up with some kind of 'motivation' plan for him where if he gets an assignment done, he can earn a star." The mean percentage of participants who contributed to a colleague each week was 75%, which was slightly higher than the face-to-face group. The online group saw a drastic increase in contributions to colleagues when using the Moodle interface, with 90% - 100% of participants contributing in all weeks using the Moodle interface except Week Five. However, participants did not report not contributing to a colleague during Week Five. More participants did not comment on contributing or not contributing to a colleague at all during this

94

week. For all weeks, no participants reported they did not contribute to a

colleague.

Code 4 – Materials/information presented by instructor.

Code 4 examined usefulness of materials or information/content presented

in the professional development course. Categories included

materials/information was useful in collaborative discussion (4.1),

materials/information was not useful in collaborative discussion (4.2),

materials/information was useful to the writer (4.3) and materials/information was

not useful to the writer (4.4). Though usefulness of materials/information

specifically to the writer was coded, this was done so in an effort to assist the

school district in professional development planning, and is not relevant to reports

of quality collaboration for the purpose of this study. Therefore, only the

usefulness of materials/information to collaborative discussion is reported (see

Appendix K for the number of incidences and percent of total responses for all

codes within Code 4). Figures 11 and 12 report the number of participants who

found course materials/information useful in collaborative discussion, did not find

course materials/information useful in collaborative discussion, or who did not

mention usefulness of materials/information in collaborative discussion.
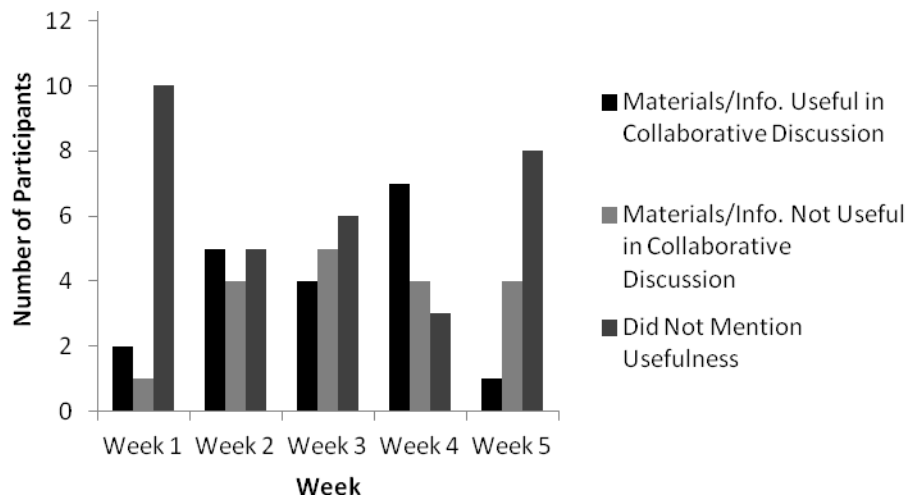
Figure 11. Number of participants who found course materials/information useful for collaborative discussion in the face-to-face group.

Participants in the face-to-face group reportedly found course materials/information more useful for collaborative discussion than the online group, though numbers were still low for the face-to-face group overall. Participants reported usefulness 19 times across weeks, and especially during Week Four, making statements such as, "The article, 'IEP Meeting…Perception of Parents of Students Who Receive Special Education Services', gave a lot of good advice because the student's parents have denied him any more services or testing," and "The PowerPoint presentation this week was very helpful in our collaborating, because it gave us the idea for creating a visual list." The mean percentage of participants who found the course materials/information useful in collaborative discussion was 29% of participants weekly. More participants in the face-to-face group also reported non-usefulness when compared to the online group. Non-usefulness was reported 18 times across weeks, and was fairly steady

96

during Weeks Two – Five, evidenced by statements such as, "The article this week talked about setting IEP goals for children on the spectrum, and although it was very interesting, didn't really relate to our situation," and "The article was not helpful in collaboration this week." A mean of 28% of participants did not find the course materials/information useful to collaborative discussion in the face-to-face group each week. Participants in the face-to-face group found the materials/information about equally useful and non-useful in collaborative discussion, and many participants did not report usefulness. During Weeks Two and Four, one participant reported that the material/information was both useful and not useful, stating that the PowerPoint was useful in collaborative discussion, but the article was not. During Week Three, two participants also mentioned usefulness and non-usefulness in the same manner; the PowerPoint was useful, but the article was not.
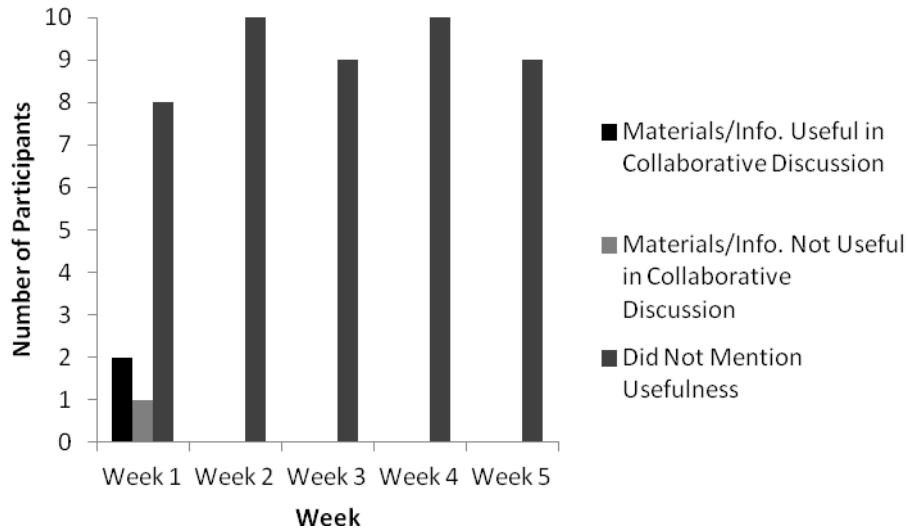
Figure 12. Number of participants who found course materials/information useful for collaborative discussion in the online group.

The online group rarely mentioned usefulness or non-usefulness of materials/information in collaborative discussion, only doing so at all during Week One. Though the online group found the course materials/information personally helpful (see Appendix K), they did not report the relationship of the materials/information to collaborative discussion. A total of two participants reported usefulness during Week One, and no other reports were made, providing an average of 4% of participants reporting usefulness weekly. One participant reported non-usefulness during Week One and no other reports of non-usefulness were made, resulting in an average of 2% of participants reporting non-usefulness weekly. Only two participants total mentioned either usefulness or non-usefulness, as one participant mentioned both, with the PowerPoint being useful, and the article not useful.

Summary – Question 1.

Based on the results for Question 1, certain aspects of quality collaboration for professional development in the area of autism were more evident in an online environment, while other aspects surfaced as quality indicators in a face-to-face environment. In general, online collaboration appeared to be of higher quality in presenting one's own situation(s) to the group, finding group discussions helpful, having enough time to collaborate, providing feedback/suggestions to group members, and perceiving suggestions for one's own situation as helpful (as evidenced by the number of suggestions that participants said they would likely implement). The face-to-face format produced higher-quality collaboration when it came to in-depth problem-solving regarding a situation, implementing suggestions for one's own situation, and relating course content to collaborative activities. Figure 13 compares mean percentages for the online and face-to-face groups in each category of collaboration.
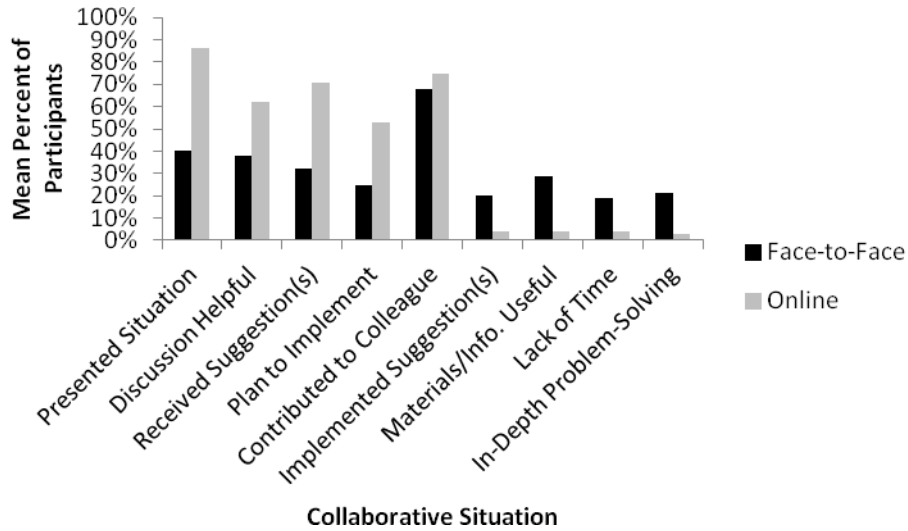
Figure 13. Mean percentage of participants in the online and face-to-face groups for each collaborative category.

Question 2 – Changes in Attitudes Toward Using Technology as a Means of Collaboration

Research question 2 examined how educators' attitudes towards technology as a means of collaboration changed as a result of participating in either a face-to-face or online professional development course in the area of autism. The pre- and post- attitudes surveys were analyzed by the researcher for content in the written comments of participants. Comments were placed in one of three categories for each question – helpful/likely/positive, not helpful/unlikely/negative, or neutral. Percentages for positive and negative comments were calculated based on the number of participants answering that question. "Neutral" categories in the pre- and post- survey comments were rarely found, and were therefore not reported in the data.

Questions in the pre-/post-survey addressed collaboration in general, and

collaboration in both face-to-face and online formats. One question addressed

implementation of suggestions from colleagues. Analyzing attitudes in each of

these categories proved useful in providing background information about

collaboration, and possible reasons for changes in attitudes in either format.

Table 2 displays the percent of positive comments for pre- and post-survey for

face-to-face and online participants for each question. Since positive percentages

and negative percentages were generally the inverse of each other, only the

number of respondents and percentages in the positive category were reported.

Table 2

Numerical Data for Attitudes Surveys

Question	F2F Pre	F2F Post	Differ-ence	O Pre	O Post	Differ-ence
1 – Collaboration with colleagues in area of expertise	67%	85%	18	80%	86%	6
2 – Collaboration with colleagues in other areas of expertise	92%	100%	8	50%	88%	38
3 – Collaboration with colleagues in a face to face setting	67%	92%	25	88%	100%	12
4 – Collaboration with colleagues in face to face setting supplemented with lecture materials	55%	69%	14	83%	100%	17
5 – Collaboration in online format	15%	33%	18	38%	50%	12
6 – Collaboration in online format supplemented with lecture materials	27%	50%	23	63%	63%	0
7 – How often to you implement new ideas and strategies within your professional work after collaborating with colleagues	77%	67%	-10	88%	86%	-2
8 – How efficient/ convenient do you find face to face collaboration with colleagues	55%	62%	7	29%	71%	42
9 – How efficient/ convenient do you find online collaboration	10%	14%	4	56%	75%	19
10 – How likely to use online	45%	36%	-9	67%	67%	0

collaboration to problem solve your challenges in the future						
11 – How likely to use face to face collaboration to problem solve your challenges in the future	75%	92%	17	60%	100%	40
12 – Collaboration with colleagues using asynchronous online in-service delivery with interactive components	14%	9%	-5	100%	100%	0
13 – How likely to seek collaborative assistance from colleagues for your challenges	100%	100%	0	100%	100%	0
14 – How likely to give collaborative assistance to colleagues for their challenges	82%	100%	18	100%	100%	0
15 – Overall rating of collaboration with colleagues (Useful to daily practices/Not useful to daily practices)	67%	85%	18	100%	100%	0
Mean Difference in Percentage (All Questions)			9.7			12.3

Note. F2F = Face-to-Face, O = Online.

General attitudes regarding collaboration.

Educators' attitudes toward using technology showed limited changes

when answering Question 2: How did educators' attitudes toward using

technology as a means of collaboration change as a result of participating in face-

to-face or online delivery formats in a professional development course in the area of autism? Before attitudes toward collaboration (in either format) were analyzed, the participants' attitudes and readiness toward collaboration in general was established. Then, the format in which participants collaborated was analyzed to determine attitudes towards technology as a means of collaboration as an isolated variable. The assumption in this analysis was that if the group thought highly of collaboration in general, then any changes in attitudes toward collaboration were based on their experiences with (or without) that technology.

As indicated in question 13, both groups were willing and ready to collaborate before participating in the course. Both the face-to-face and online groups were very likely to seek collaborative assistance from colleagues for their own professional challenges when addressing the needs of students with autism, both before and after the course, with percentages at 100% for positive attitudes both pre- and post-survey. Participants made statements such as, "I would want to have any help available to me," and "I always ask others when I can't figure out a problem with a student," showing their willingness to seek assistance for their professional challenges. This willingness was not affected after participating in the course, even if the assistance they received was not exactly what they were looking for as indicated in participant reflections. This group was willing and ready to partner professionally with colleagues prior to participating in the course.

In addition, most participants were also likely to give collaborative assistance both before and after the course (Question 14). The online group saw pre- and post-survey percentages of 100% in this area, and participants in the

104

face-to-face group started high at 82%, and increased their positive attitudes to 100%. This finding shows that the idea of giving collaborative assistance was positively affected or remained positive after taking the professional development course.

Attitude changes for the online group.

To specifically answer the research question, questions regarding online collaboration (technology as a means of collaboration) were the most essential. Questions 5, 6, 9, 10 and 12 specifically address attitudes about online collaboration. Participants' comments reflected both positive and negative attitudes regarding online collaboration. For example, one participant in the online group went from a pre-survey statement of, "(Online collaboration is) not as efficient as face-to-face," to, "I think it's very convenient because there is not a required time to be somewhere," showing a positive increase in attitude about using technology as a means of collaboration. At the same time, another participant in the online group started out with a positive attitude toward online collaboration, stating, "(Online collaboration is) more convenient", but ended with a negative attitude post-survey, stating, "The collaboration may not be done in a timely manner and could hinder your accommodations."

Many of the online participants increased their positive attitudes about face-to-face collaboration when addressing the needs of students with autism. One participant started out stating, "More communication is needed (in face-to-face collaboration)," but ended post-survey stating, "Face-to-face allows for immediate feedback and more detailed responses." Other participants who had

105

positive attitudes about face-to-face collaboration after participating in the online

course made statements in the post-survey such as, "I was online, but would have

loved to be face-to-face (because) I feel I would have been able to share more,"

and "(Face-to-face is) a quicker way to get/give feedback and strategies." One

online participant seemed to be on both sides of the fence, and made a more

neutral statement, professing, "On one hand, there is a quicker exchange of ideas.

On the other, not everyone speaks up and shares."

When asked how helpful they found collaboration in an online format

(Question 5), the online group increased positive attitudes by 12 percentage

points. Statements such as, "Everyone's concerns/issues are able to be met; no

one has to wait their turn," and "It was a different way for me to learn – took time

to get used to it, but by the end I learned a lot," reflected positive attitudes for this

question. However, no changes in positive attitudes were noted when asked how

helpful they found collaboration in an online format supplemented with lecture

materials (Question 6), though most comments regarding this question were

positive, including statements such as, "Again, nice to have something tangible to

refer back to if needed," and "There is a reference point when discussing issues."

Overall, the online group increased positive attitudes about the

efficiency/convenience of online collaboration (Question 9) by 19 percentage

points. Several online participants made positive statements about the

convenience of online collaboration on the post-survey, stating, "It was

convenient because we could do it on our own schedule," "Very convenient," and

"I think it's very convenient because there is not a required time to be

somewhere." Negative attitudes about its convenience post-survey were found in statements such as, "It takes too long and does not provide enough detail," and "I felt a little pressured to have to look online daily."

When asked whether they would use online collaboration to problem solve in the future (Question 10), the online group's attitudes did not change, but comments were mostly positive. Positive comments included statements such as, "If we had a 'Moodle' that we could use regularly, that would be helpful," "I think the Internet has provided a very convenient way for professionals to quickly, yet effectively collaborate and share ideas," "This was a learning experience for me that helped me collaborate online," and "You can post and go; response will be waiting." However, one online participant stated, "As convenient as it was, I would rather be forced to go to class," and two made more neutral statements, saying they would use it if they were sure to get timely feedback.

Regarding online collaboration using asynchronous, interactive components (Question 12), online participants' attitudes did not change, but remained at 100% both pre- and post-survey. Statements representing this overall positive attitude included, "Found it very beneficial," "I like being able to read and respond to a variety of different situations and challenges presented through the Moodle," "Easy to use," and "I can post problems and check later at my convenience for ideas."

Several online participants also made positive statements about using face-to-face collaboration, and increased positive attitudes on all questions specifically

addressing face-to-face collaboration. The percent of positive comments for both groups regarding face-to-face collaboration are addressed in questions 3, 4, 8 and 11. Though the research question does not address attitudes about face-to-face collaboration after participating in the course, findings for these questions were useful in interpreting possible reasons for attitude changes, or lack thereof, in regards to online collaboration. Statements such as "I believe face-to-face is more effective," "I still like face-to-face interaction of talking with others", and "(It's) much more direct and solves problems faster," were just a few of these statements. The online group's positive attitudes about using face-to-face collaboration in the future (Question 11) increased by 40 percentage points, while their positive attitudes about the efficiency/convenience of face-to-face collaboration (Question 8) increased by 42 percentage points. Regarding the helpfulness of collaborating with colleagues in a face-to-face setting (Question 3) and in a face-to-face setting supplemented with lecture materials (Question 4), positive attitudes also increased by 12 percentage points and 17 percentage points, respectively. Overall, these changes show a major increase in positive attitudes about face-to-face collaboration, even after participating in an online course, with a mean difference of 27.8 percentage points.

In sum, attitude changes for the online group regarding technology as a means of collaboration changed either positively, or no change was found. The online group saw positive increases for the helpfulness of online collaboration with colleagues and the efficiency/convenience of online collaboration when addressing the needs of students with autism. Overall, the online group's positive

attitudes increased by a mean of 6.2 percentage points for all questions related to online collaboration (technology as a means of collaboration).

Attitude changes for the face-to-face group.

Based on participant comments, attitude changes regarding technology as a means of collaboration were found to increase, on average, the same amount in the face-to-face group as they did in the online group. Most participants in the face-to-face group started out thinking fairly highly of face-to-face collaboration, and thought even more highly of face-to-face collaboration after participating in the course (all but one participant). One participant changed her attitude from negative to positive regarding face-to-face collaboration, stating pre-survey, "(Face-to-face collaboration) has never happened," to "Presenting an issue to a colleague face-to-face I find extremely helpful; this works better for me than online." One participant carried a negative attitude about face-to-face collaboration and a positive attitude about online collaboration throughout the course, and though a specific change in her attitude was not found, she made statements regarding the ineffectiveness of face-to-face collaboration such as, "Because of this class, I have realized when collaborating with my colleagues face-to-face that it is very difficult to talk and get my problem heard without being interrupted, especially when there is more than two people involved in the conversation," and "Time is a factor; although the lecture portion is good because it gives 'food for thought', there is often not enough time for all group members to share either a problem or give a solution." She also made positive statements about online collaboration such as, "Sounds very interesting, efficient and

convenient," in both the pre- and post-survey. Outside of those two situations, all other participants in the face-to-face group appeared to think highly of face-to-face collaboration, especially after participating in the face-to-face course.

Regarding collaboration with colleagues in a face-to-face setting, post-surveys saw statements such as, "It's helpful in being able to have immediate feedback and observe body language," "I prefer face-to-face; I get REALLY frustrated sometimes when using the computer and it is often a 'turn-off' to using it," and "I like making eye contact and reading the expressions of the people I'm speaking to or working with." Tangents and elaborations in discussions were also mentioned as being positive aspects of face-to-face collaboration. Negative attitudes were seen both pre- and post-survey regarding online collaboration, as evidenced by statements such as, "I don't like computers," "It's frustrating waiting for responses when I want the information yesterday," "I'm not very technology savvy; besides I don't like to look at a screen for long periods of time," and "I would not spend a lot of time looking at an online format: I'm very visual."

Only one area regarding face-to-face collaboration – efficiency/convenience (Question 8) – did see somewhat negative statements made by face-to-face participants, and only an increase in positive attitudes of 7 percentage points. One participant made a pre-survey statement of, "My colleagues are usually available before and after school," to a post-survey statement of, "Sometimes it's difficult to have time to get colleagues together to discuss student needs. Everyone is so busy!" However, determination cannot be

110

made as to whether or not this statement was made about colleagues at her own school, or in the professional development course. Other somewhat negative statements regarding the efficiency/convenience of face-to-face collaboration included, "I feel it is sometimes difficult to find time to collaborate. In the class – it worked well – in the real world it may be harder to find time to connect with others," and "Hard to set time to talk together when everyone is free to do that." Once again however, a determination cannot necessarily be made as to whether these statements were made about collaboration in daily practices or the professional development course.

When asked how helpful they found collaboration in an online format (Question 5), the face-to-face group increased positive attitudes by 18 percentage points, and 23 percentage points when asked how helpful they found collaboration in an online format supplemented with lecture materials (Question 6). Positive statements included, "I think online would be easier because at least then you are not "fighting" for a chance to talk or be heard; everyone has equal chance to share their opinion," and "I would imagine (online collaboration supplemented with lecture materials) would be helpful because you could hear or read lecture materials then have time to walk away and let it digest then come back to a blog and state your opinion."

The face-to-face group also increased positive attitudes about the efficiency/convenience of online collaboration (Question 9) by 4 percentage points, although there were not many participants overall who had positive attitudes for this question pre- or post-survey. Attitudes related to this question

ranged from statements such as, "Online seems like it would be more efficient because you can hear many opinions on your own timeline; it's not as limited as face-to-face because on a blog, for example, you can have hundreds of opinions and read through them at your leisure," to "I'm not inclined to collaborate online."

Regarding using online collaboration to problem solve in the future (Question 10), the face-to-face group decreased positive attitudes from pre- to post-survey by 9 percentage points. Many negative statements were made related to this question, including, "It's best to dialogue face-to-face so you don't leave anything out; I like to solve problems by discussing," "I think I'd go to who I know, trust and respect before I get advice from a random teacher online," and "I'm more likely to seek out face-to-face collaboration."

A decrease in positive attitudes was also seen in the face-to-face group for the helpfulness of collaborating with colleagues using asynchronous online in-service delivery with interactive components (Question 12). For this question, positive attitudes decreased by 5 percentage points in the face-to-face group, and very low percentages were seen both pre- and post-survey. Many negative statements were made in regards to this question such as, "(It) doesn't sound appealing to me," "I don't like computers," "I'm not very comfortable with many technologies," and "Technology scares me."

After participating in the face-to-face course, it appears that the face-to-face group continued to be fonder of the face-to-face format for purposes of collaboration. Minimal change was seen in positive attitudes regarding using

112

technology as a means of collaboration, though positive attitudes did slightly increase for three questions specifically related to online collaboration. When answering the research question, overall, the face-to-face group increased their positive attitudes about using technology as a means of collaboration by a mean of 6.2 percentage points on all survey questions specifically related to technology (Questions 5, 6, 9, 10 and 12), and even decreased positive attitudes on two questions. Positive attitudes for the face-to-face group did show a more considerable change when specifically addressing face-to-face collaboration (Questions 3, 4, 8 and 11). The the face-to-face group thought highly of face-to-face collaboration overall, and a 15.8 percentage point difference was seen from pre- to post-survey, in terms of positive attitudes.

Summary – Question 2.

Changes in attitudes regarding technology as a means of collaboration were limited, but changed in both positive and negative directions, offering mixed results. Specifically related to attitudes about technology as a means of collaboration, the online group increased positive attitudes about the helpfulness of collaborating in an online format and the efficiency/convenience of online collaboration. No changes were seen for the likelihood of using online collaboration to problem solve future challenges, interest in collaborating with colleagues using asynchronous online in-service delivery with interactive components, or helpfulness of collaborating in an online format supplemented with lecture materials (though percentages were at 100% for this question both pre- and post-survey). The face-to-face group increased positive attitudes about

113

technology as a means of collaboration for the helpfulness of collaborating in an

online format and an online format supplemented with lecture materials, and the

efficiency/convenience of online collaboration. Positive attitudes decreased for

the face-to-face group regarding the likelihood that they would use online

collaboration to problem solve future challenges, and their interest in

collaborating with colleagues using asynchronous online in-service delivery with

interactive components. Both the online and face-to-face groups increased

positive attitudes in all areas specifically regarding face-to-face collaboration.

Summary of Findings

Changes in attitude towards using technology as a means of collaboration

were the same for both groups. While changes were minimal overall, with a mean

increase of 6.2 percentage points, attitudes did increase in a positive direction.

Though percentages of positive attitudes began higher and remained higher in the

online group than they did in the face-to-face group, results indicative of the

quality of their collaborative problem solving were variable. Compared to the

face-to-face group, collaboration was of higher quality for the online group in the

areas of presenting one's own situation(s) to the group, finding group discussions

helpful, having enough time to collaborate, providing feedback/suggestions to

group members, and perceiving suggestions for one's own situation as helpful (as

evidenced by the number of suggestions that participants said they would likely

implement). Although the online group saw slightly higher levels of quality

collaboration, and despite their generally positive perceptions of the process

overall, a summary of comments on the post-survey strongly indicated that the

online format was not appropriate for all collaboration. The face-to-face group, whose attitudes towards using technology as a means of collaboration started low, increased by the end of the professional development course, but overall still remained much less positive than the attitudes of the online group. Like the online group, the face-to-face group's comments on the attitudes survey indicated a higher level of support for a face-to-face format for collaboration, though lower levels of quality collaboration were found in the face-to-face format based on written reflections.

The variability of these results indicates that although the online format was a viable delivery mechanism for professional development, areas such as in-depth discussion, implementing suggestions, and relating course content to collaborative activities may be better served in a face-to-face format. Furthermore, although positive attitudes increased for both groups in many areas related to online collaboration, overall changes were minimal from pre- to post-survey, and some areas saw a decrease or no change in positive attitudes. This demonstrates the possibility of positively changing attitudes about technology as a means of collaboration, but reveals that more can be done to make online collaboration enticing, satisfactory, and of higher quality when it comes to collaboration.

Chapter 5

SUMMARY AND DISCUSSION

In this final chapter, results of the study are summarized and discussed, incorporating the literature and researcher interpretations. Numerical data are expanded on, and participant quotes are included where they provide the opportunity for greater understanding of results. Additionally, implications for education, limitations, and ideas for future research are explored.

The field of special education is very demanding (Frey, 2009), and educators of children with autism and other special needs frequently lack necessary knowledge for effectively educating their students (Frey, 2009; Helps, Newson-Davis, & Callias, 1999; McCabe, 2008; Kraemer, Cook, Browning-Wright, Mayer, & Wallace, 2008; Lerman, Vorndran, Addison, & Kuhn, 2004; Lang & Fox, 2004). Educational research in the field of autism is plentiful and necessary as diagnoses continue to increase, and students with autism who may require specialized instruction and supports are placed in both public and private school settings. This study expanded on educational research in the field of autism by examining the quality of collaboration found in a professional development course for educators of students with autism, offered in face-to-face and asynchronous, online formats.

The intent of this study was to determine effective professional development methods for educators of students with autism, as often they may be undertrained or in need of assistance with interventions (Frey, 2009). Educating students with autism can be challenging due to the spectrum nature of the

disorder, as one student with autism may be completely different from another, and situations experienced may vary greatly from one educator to the next. In addition to increasing content knowledge of autism by means of direct instruction and supplemental materials, effective professional development can be successfully fostered through dialogue, reflection, support and challenge, and being allowed the opportunity to ask questions, share ideas, and share suggestions (McCabe, 2008). Collaborative opportunities such as these were the major focus of study in the related professional development course.

Discussion - Question 1

In what ways did format delivery, face-to-face or online, of a professional development course in the area of autism impact the quality of collaborative problem solving for teachers? Though ideas about quality collaboration may be subjective, specific indicators of quality helped to discern quality aspects of each learning format. The indicators used to establish quality collaboration, as described in Chapter 2: participation, interdependence, synthesis of information (Thompson & Ku, 2006; Hathom and Ingram, 2002; Zafeiriou, Nunes & Ford, 2001; Johnson, Johnson & Smith, 1998; Kaye, 1992; Laffey, Tupper, Musser & Wedman, 1998), dialogue, decision-making, action and evaluation (Gajda & Koliba, 2008), were demonstrated in both the online and face-to-face groups. Based on comments in written reflections, the following characteristics of quality collaboration related to these indicators were found in the professional development course:

117

- Presenting one's own situation to the group, represented by the quality indicator of participation (Thompson & Ku, 2006).

- In-depth problem-solving regarding a situation, represented by the quality indicators of participation and interdependence (Thompson & Ku, 2006).

- Finding group discussions helpful, which is fostered by high-quality interdependence (Thompson & Ku, 2006) and dialogue (Gajda & Koliba, 2008).

- Having enough time to collaborate, providing the opportunity for increased participation, synthesis of information (Thompson & Ku, 2006) and dialogue (Gajda & Koliba, 2008).

- Implementing suggestions for one's own situation, represented by the quality indicators of decision-making and action, in turn providing the opportunity for evaluation (Gajda & Koliba, 2008).

- Perceiving suggestions for one's own situation as helpful, represented by the quality indicator of decision-making, in turn providing the opportunity for action and evaluation (Gajda & Koliba, 2008).

- Providing feedback/suggestions to group members, represented by the quality indicators of participation, interdependence (Thompson & Ku, 2006), dialogue and synthesis of information (Gajda & Koliba, 2008).

- Relating course content to collaborative activities, providing the opportunity for increased participation, synthesis of information (Thompson & Ku, 2006) and dialogue (Gajda & Koliba, 2008).

Presenting one's own situation to the group.

The face-to-face group presented their own situations considerably less than the online group although they were divided into smaller discussion groups, while the online group discussed as one large group. Many factors may relate to the ability to present one's own situation, especially the possibility of less verbal interplay in an asynchronous online environment. Verbal interplay can often lead to stories, tangents, or more detail about specific situations, and may have occurred at a greater rate, or at least a more synchronous rate, in the face-to-face group. Though participation and dialogue (Thompson & Ku, 2006) are embedded in verbal interaction, the degree to which participants participated and dialogued about their own situations was lower in the face-to-face group. When using Moodle, participants were able to concisely describe their situation, with no immediate feedback, therefore being able to post to the discussion board with immediacy. Feedback was then retrieved at a later time, convenient to the participant. Additionally, learning styles may also be a factor when presenting one's own situation to the group. Maloney (1999) contends that online instructional formats allow students to think more critically and may even reduce anxiety about contributing to class discussions. Crawley et al. (2009) also suggest that the frequency of conversation experienced in an online group may help students to feel more of a sense of belonging, helping them to feel confident about participating.

Because of the marked difference in the number of participants who were able to present their own situations in the face-to-face versus online groups,

presented situations for face-to-face participants were analyzed by Subgroups to determine a possible explanation. A few participants in the face-to-face group made statements in reflections that made it unclear as to whether or not they actually presented their own situation. For example, one participant stated, "My colleagues and I discussed communication challenges that students with ASD have," and another participant stated, "We focused on social skills and communication." Each of these statements reflects the fact that the group did discuss autism in some way, but does not make clear if a specific person presented a situation, affecting results for participants who did or did not present their own situations.

Domination of discussion time by one or more participants appeared to be a factor in several Subgroups. Subgroup One (four participants) presented the most situations, reporting 11 situations presented across weeks. However, 6 of these 11 times, the situation was a repeat of a prior situation, and two participants tended to dominate the discussions by presenting their own situations 8 of 11 times. One participant in this group only presented a situation once, and the other participant presented only two times. In each of the other three Subgroups, it was found that almost always, only one participant presented a situation in any given week. Subgroup Two reported that only one situation was presented per week, two of which were repeated situations. Of these five situations, four of them were presented by the same participant, and one participant did not report presenting a situation at all. In Subgroup Three, one participant presented each week other than Week Three, when two whole-group situations were discussed. Of the six

situations presented, four of the six were presented by the same participant, and the other two participants presented once each. Two of the situations presented turned into whole-group discussions (topics were relevant to all participants) as reported by participants, and presented situations were repeated three times. Subgroup Four reported that one situation was presented each week, and two situations were presented in Week One. Of the six situations presented, three of the six were presented by one participant, two by another participant, and one by the last participant. Only one time, a situation was repeated across weeks.

In the online group all participants presented situations a minimum of three times. Three participants presented their own situations three times each, three presented four times each, and four presented five times each. Likely all participants in the online group could have easily presented a situation on the Moodle interface every week, due to its asynchronous nature. One participant turned in her reflection early during Week Five, and therefore did not present a situation on the Moodle interface, commenting, "I did not Moodle (about this) since we were on break." Another participant did not have students with autism in her class, but weekly, she posted situations for one of her colleagues at school. During Week Four, she stated, "This week I did not post any of my own problems or questions as I do not have any kiddos with ASD. I asked my teammates if they had any problems or situations that they would like me to post, but none of them had any for me this week." During Week One, the online group met in a face-to-face format, and one participant made the statement, "Due to time constraints I was unable to share about my student." Any other circumstances

121

surrounding a participant not presenting her own situation in the online group were unclear.

Participant demographics within groups may have played a role in presenting situations. The face-to-face group did not contain any participants who specifically taught special education, whereas in the online group, half of the participants were special education teachers. Special education teachers may have had more experiences working with students with autism, and therefore more challenges they could present. However, the course advertisement recruited educators who had, have, or will have students with autism in their classes, so all or most participants likely had challenges to present. Additionally, knowledge and experience in working with students with autism were basically commensurate in the online and face-to-face groups.

Educators have many questions about students with autism (National Research Council, 2001), and although one may glean ideas by listening to thoughts on someone else's situation, all students with autism are different, and individual details of the situation will vary. The findings of this study support the notion that if participants in a professional development course on autism desire the ability to present the specific situations that challenge them, an online environment may be a better choice.

In-depth problem-solving.

For some participants, quality may have been thought of as going more in-depth about a situation, which was more evident in the face-to-face group, verified by the number of same situations presented from week to week. In the

face-to-face group, participants presented the same situations a total of 11 times, whereas this occurred only one time in the online group. In the face-to-face group, one situation regarding a junior high boy diagnosed with high-functioning autism who had difficulty demonstrating knowledge was discussed three times across weeks. A high-school student in an Honors German class, who had difficulty completing assignments, was followed for four weeks. Still another situation entailing an elementary student with autism, who was "hyper-focused" on the guitar in music class, was brought up three weeks in a row. Possibly these situations were more challenging than the situations of other participants and warranted more in-depth discussion, or perhaps several group members related to the situations and therefore did not mind discussing them repeatedly. On the other hand, there was evidence to suggest that those who did not often get a chance to present their own situations did not hold the same perceptions of quality collaboration that others might have. Though participants did not portray negative attitudes in written reflections when their own situation was not presented, occasionally negative attitudes were found in the attitudes surveys regarding the inability to present one's own situation because one idea may have dominated the discussion, limiting the possibility of presenting new ideas. The benefits of problem-solving situations across weeks is an area of further research to determine if this aspect of quality collaboration actually increases participants' satisfaction.

Finding group discussions helpful.

The online group found the collaborative discussions more helpful overall than the face-to-face group, making more statements such as, "I had a lot of great feedback, and will certainly make notes to myself about each suggested idea," "Collaborating with classmates on a situation I discussed helped me quite a bit," and "I found the discussions during the class to be very helpful and valuable." Again, findings from analysis of presented situations indicate that more group discussions were dominated by particular group members in the face-to-face group, leaving less opportunity for participants to present their own situations, and receive specific feedback in the discussion that was helpful to them. Statements were rarely made related to discussions not being helpful. One participant in the face-to-face group actually referenced lack of time in conjunction with non-helpfulness of the discussion, stating, "Collaboration with my classmates in the discussion that we held did not help me problem solve and intervene in my situation as we only had time to share the above scenario during our class time." Another participant in the face-to-face group suggested that the discussion was not helpful because past situations were being discussed, stating, "The discussion we had did not relate to current situations. They were merely reflections of past situations. Therefore, the discussion did not help with a current situation." Still another participant reported that the discussion did not produce viable solutions, stating, "In my case, the collaboration with my classmates did not produce any solution or suggested intervention."

124

The online group actually reported the discussions to be not helpful more than the face-to-face group overall, especially during Week Four. Helpfulness of the discussions actually decreased across weeks for the online group, and non-helpfulness of the discussion generally increased for all weeks but Week Five. In the online group, lack of helpfulness appeared to be more related to lack of viable suggestions or suggestions already being attempted, as evidenced by statements such as, "The feedback I got back was to have conversations with the para (educators) or model for them, which honestly didn't help me all that much," and "While these are great ideas, I did not find the online discussion as helpful this week as in previous weeks. I was hoping to open up a conversation about how certain things are done at different schools regarding students with ASD, but this did not happen." Once again, more situations presented in the online group opened up the possibility for more feedback, and increased opportunity for perceived helpful and non-helpful discussion. The face-to-face group also did not comment on helpfulness of the discussion in their written reflections more than the online group, which leaves actual perceptions of the discussion's helpfulness unknown.

As perception of the discussion's helpfulness may directly relate to attitudes about the discussion, this aspect of quality collaboration should be considered when planning professional development courses in the area of autism in order to increase participant satisfaction. Specific elements of course format that make a discussion more helpful for participants may need to be further

explored. For the purposes of this study, the online group found the discussions more helpful overall.

Having enough time to collaborate.

This characteristic of quality collaboration was explored in both groups in an effort to explain participation and dialogue, or lack thereof, within groups. Overall, the face-to-face group reported lack of time to collaborate more frequently than the online group. In fact, the online group did not report lack of time at all during Weeks Two – Five, when using the Moodle interface. Lack of time to collaborate was reported twelve times across weeks in the face-to-face group, evidenced by statements such as, "Due to time constraints, my classmates and I were unable to go into great depth with our discussion," "We only had five minutes to discuss this student so there was not much time to discuss and contribute," "No other issues were discussed as there was not sufficient class time," and "Collaboration with my classmates in the discussion that we held did not help me problem solve and intervene in my situation as we only had time to share the above scenario during our class time." Once more, domination of the discussion, and the opportunity for most groups to only discuss one situation per week, may be factors in the face-to-face group's mention of lack of time. Week One saw the highest number of participants reporting lack of time. However, less time was allotted for group discussion during this week, as course procedures were discussed, groups were chosen, and the pre-test/survey was taken during class time.

The format of the online group appears to be of higher quality when it comes to having sufficient time to collaborate. Characteristics of the online format such as the asynchronous nature of the discussion groups may set the occasion for increased time to collaborate, while domination of one topic during face-to-face discussions may decrease time to collaborate. Specific elements of both formats that allow for or disallow time to collaborate might be further explored.

Providing feedback/suggestions to group members.

The online group consistently reported having a higher number of suggestions received for their situations than participants in the face-to-face group, and also reported giving more suggestions. Though participant reports of giving suggestions may be considered the inverse of reports of receiving suggestions, both were measured in an attempt to acquire as accurate a picture as possible for this characteristic of collaboration. Findings demonstrated that reports of giving and receiving suggestions were not exactly paired. In other words, the number of suggestions reported as given in each group, was not commensurate with the number of suggestions reported as being received. This fact demonstrates the possibility of a discrepancy in what actually happened in discussions, and what may have been reported. However, using both measures to assess the number of suggestions that occurred within each group, at the least gives a more thorough understanding overall.

The number of participants who reported receiving a suggestion in the face-to-face group was far lower than the online group for all weeks except Week

Five, where equal numbers of suggestions were received in each group (though percentages vary based on the number of participants in the groups). The face-to-face group also saw many more non-responders in written reflections, which may have played a role in accuracy. In both groups, the average number of participants who reportedly did not receive a suggestion was almost equal, and extremely low, demonstrating that when situations were presented by a participant, it was rare that they did not receive suggestions, and if they did not receive suggestions, it did not necessarily affect them enough to report it.

Where lack of suggestions were received, a participant in the face-to-face group stated, "I didn't receive any advice so much listening and inquiries about how I teach the classes, but it is nice to share my situation and be of some assistance to other colleagues." This statement indicates that although a suggestion was not necessarily received, the participant still enjoyed sharing her situation and giving suggestions to others. One participant in the online group commented, "I have not yet received any feedback or ideas from fellow classmates about how I might help the child." This statement indicates the possibility that due to the asynchronous nature of the online format, the participant may have written the reflection before all suggestions were received, and therefore she may have received a suggestion at a later time. The number of participants receiving suggestions in the face-to-face group varied from week to week. In the online group, numbers were high for all weeks other than Week Five, where a dramatic decrease was found. Possibly participants could have written reflections before receiving suggestions as indicated in the above

128

comment, as they hurried to finish up the course. Or, perhaps participants in the online group tired of giving suggestions or checking the Moodle for suggestions during the last week. Additionally, they were required to report to the face-to-face group's last class during Week Five to take the post-test/survey, and may have been confused about requirements for participation on the Moodle. For the online group, the decrease in receiving suggestions during Week Five directly relates to reports of giving suggestions, where Week Five also saw a dramatic decrease.

Both the face-to-face and online groups gave a fairly high number of suggestions across weeks, reporting an average of approximately 70% of participants giving suggestions each week in both groups. The online group considerably increased the number of suggestions they gave from Week One to Week Two, when discussing on the Moodle interface. This increase remained steady during Weeks Three and Four as well, ranging from 90% - 100% of participants giving suggestions, but as noted above, decreased during Week Five. Participants in the online group did not report not contributing to a colleague at all across weeks.

The face-to-face group reported giving suggestions more often than they reported receiving suggestions, and fairly high numbers here indicate that they were more willing to participate in the discussion by giving suggestions, than by asking for assistance with their own situations. The number of participants giving suggestions in the face-to-face group gradually increased during Weeks One – Four, peaking at Week Four. Examination of written reflections reveals no

particular motive for the increase in Week Four. In one group, a participant

presented a situation related to a student that another member of the group also

worked with in prior years, possibly allowing for at least one more participant to

contribute than normally might have. Also, statements such as, "We talked about

implementing last week's idea of social stories," and "After (the instructor's)

lesson we decided to put off social stories until after Spring Break because we

liked the possible benefits of an emergency kit with the student we had

discussed," indicate that participants may have had the ability to provide more

suggestions due to knowledge gains over the weeks. Though a decrease in giving

suggestions was seen in Week Five for the face-to-face group, the number of

participants giving suggestions remained the same as Weeks One and Two, and

may have possibly been due to the varied schedule for the last class (taking the

post-test/survey), contributing to less time to collaborate overall.

Though reports of not giving suggestions were low every week for the

face-to-face group, they were still higher than the online group, where this was

not reported at all. One participant not giving suggestions commented, "I was

unable to contribute an idea, because I haven't worked with or learned very much

(yet) about the autistic/Asperger's population," indicating the possibility that

where lack of suggestions occurred, lack of knowledge was the cause. However,

most participants in the face-to-face group did not give a reason for their lack of

contribution, only making statements such as, "(I did not) have a contribution this

week to the other group members' students," and "There were no further

collaborative contributions from my classmates on my issue and no contributions from me."

Here again, the number of situations presented in the online group was higher than in the face-to-face group, providing the opportunity for more suggestions to be given or received. More participants in the online group were also able to make suggestions for specific situations, as they functioned as one large discussion group during Weeks Two – Five, rather than separate small groups as in the face-to-face group. Possibly participant demographics may have also played a role in fostering collaboration within groups. Five of the ten participants in the online group were special education teachers, and of the others, four of the five participants taught elementary general education (no specific subject area). As indicated in Appendix K (Code 3.1), similar situations were reportedly experienced more in the online group. Though there were some similar demographics seen in the face-to-face group as well (e.g. three music teachers), grade levels and subject areas were more varied in this group. Because more suggestions were given and received overall in the online group, experiencing similar situations may have led to an increase in suggestions given during collaboration, due to prior knowledge and similar experiences.

When planning professional development, considering whether or not participant demographics will contribute to quality collaboration may be beneficial. In this study, where more similar situations were experienced, possibly more suggestions were able to be given drawing on past experiences. However, the nature of the collaborative format (face-to-face or online) is

131

unlikely to have contributed to the perception of similar situations being experienced by the participants, although more conversation may allow for reflection on more situations, increasing the possibility of finding a situation similar to one's own. Although experiencing similar situations may not necessarily be an indicator of quality collaboration in relation to a particular format, it may contribute to quality collaboration overall in many areas including dialogue (Gajda & Koliba, 2008), participation, interdependence, and synthesis of information (Thompson & Ku, 2006).

Overall, collaboration in the form of giving and receiving suggestions was higher for the online group. As indicated above, many factors may contribute to this higher level of collaboration. Though it may be easier to post to an online discussion board than to be heard in a traditional discussion, participants must still make decisions about when and how often they participate, and what contributions they will read and answer (Schwan, Straub & Hesse, 2002). Particular learning styles of participants who contribute more in face-to-face or online settings may be a necessary factor to explore in the improvement of professional development.

Implementation of suggestions (implementing suggestions for one's own situation and perceiving suggestions for one's own situation as helpful).

In this category of quality collaboration, the face-to-face group saw slightly better results overall, though implementation was minimal in both groups. The face-to-face group also implemented some suggestions that proved to be

ineffective, whereas the online group's implementation was effective every time, albeit implementation was low. When it came to participants reporting they would implement suggestions in the future, the online group reported this much more frequently than the face-to-face group, making statements such as, "In collaborating, I was given a suggestion to let the student chew gum if this incident keeps happening, it was something I wouldn't have thought of and I'll definitely use if I need to," "I think this is a great idea and I am looking forward to trying it out," and "This student does respond will to positive attention from his teachers, so I will try the motivation chart next week."

Ideally, more implementation and reporting of results would have been beneficial for participants in being able to evaluate their collaboration in terms of decision-making and action (Gajda & Koliba, 2008). Knowledge of the timeline in which participants received feedback and suggestions versus when they wrote their reflections (all in one week or less), indicates that participants may not have had time to implement suggestions prior to writing their reflection, possibly contributing to the low number of implemented suggestions overall. Statements that represent this possibility include, "One suggestion that we will not implement this week is communicating with a buddy. There is not enough time and we want to focus on communicating within the classroom," and "We talked about implementing last week's idea of social stories. Due to the crazy week there was not enough time to try these with the few kids we had planned." Situations may have also changed, leading to less implementation of suggestions. For example, one participant commented, "Previous recommendations to help my student

attend in class haven't been tried because he hasn't been coming to my class due to testing and temporary conflicts in schedule." Other suggestions simply may not have been decidedly effective for participants, as evidenced by statements such as, "We discussed the umbrella idea and decided that because of his severe stimming it might be dangerous to others around him," and "I am not sure if this is a strategy I will be implementing with this student (as) it almost seems as though it is giving the student what he wants (and possibly another way for him to compete with his classmate) instead of coming up with a solution for the problem."

Implementing strategies for individuals with autism is often a trial-and-error, as individuals with autism may vary greatly in needs. Even with every intention of familiarizing oneself with an individual with autism and his/her needs, the nature of the disorder as a spectrum disorder leaves room for the possibility that even the most scientifically-based interventions may work for one individual with autism and not another. The nature of the face-to-face group appeared to be slightly more effective in suggesting strategies that were actually put into action and implemented. Perhaps suggestions were more in-depth, or more easily comprehensible when learning about them face-to-face (e.g. modeling may have been involved). Though statements reflecting these possibilities were not seen in written reflections, they were seen in attitudes surveys. Of course, the face-to-face group may have simply reported on implementation more frequently, or the online group may have valued the suggestions, but may not have implemented them immediately.

134

The online group did appear to believe that suggestions received were worthy of being implemented, as they mentioned significantly more than the face-to-face group (in all weeks except Week Three) that they would likely implement the suggestions they received.

Findings in this category overall (implementation of suggestions) are somewhat inconclusive, though the slightly higher trend of the face-to-face group actually implementing suggestions may suggest this aspect of quality collaboration to be more effective in a face-to-face format. Future research may be warranted to determine what elements need to be in place so that collaborative suggestions are more readily turned into actions on the part of participants, and if certain types of suggestions (e.g. more in-depth suggestions or suggestions that are modeled) are more likely to be implemented.

Perceiving course materials or information as relevant to and useful in collaboration.

Course content and related materials may contribute to the quality of collaboration within a group if knowledge gained from this information is relatable to the discussion at hand. Participants started out with varying knowledge about autism, and experiences with autism, possibly limiting the ability of some participants to give suggestions and collaborate. In a professional development course, course content and supplemental materials may help participants to increase their knowledge about a topic, and collaborate effectively.

The face-to-face group reported that course content and/or supplemental materials were effective for collaborative discussion much more frequently than

135

the online group. In fact, the online group did not mention usefulness of materials to the collaborative discussion at all after Week One. Participant comments evidencing usefulness of materials/information included, "The PowerPoint presentation this week was very helpful in our collaborating, because it gave us the idea for creating a visual list," and "The course content was very useful in that it provided characteristics for communication and social interaction for students who are on the autism spectrum. This student seemed to not understand the effects her actions were having on the teacher as well as the other students."

Both groups had access to the same PowerPoint presentation and supplemental articles. However, inherently the format in which the PowerPoint was presented was different between groups. In the face-to-face group, the instructor taught from a script related to the PowerPoint presentation, immediately preceding the group discussion, whereas in the online group, the presentation was simply available for participants to peruse on their own. This difference in format could have well affected the way in which participants received and synthesized information, and was apparent in comments regarding the instructor's contribution to the lessons, such as, "Our discussions with (the instructor) served as clarification that students need more time to complete work, as in the case with the high school student," "After listening to (the instructor's) presentation, we had lots of ideas to help (our student) with his anxious behaviors. Some of our suggestions were based off the PowerPoint," and "The course content was really helpful in our discussion. Many of the ideas, such as the pass to the office, were directly from the presentation by (the instructor)."

Based on analysis of written reflections, it appeared that the online group may have simply given suggestions derived from past experiences. Participant comments surrounding collaboration such as, "I responded because I have two MIMR students who come into my classroom during my centers and reading group time. I have noticed this exact behavior with some of my most helpful and friendly kids," "I've had the same situation in the past and had to eventually ask for a heads up on when the fire drills were going to be," and "I commented on the student leaving the room. I mentioned giving him a code phrase, which I had done with an 8th grader in the past," represent this possibility. The online group did not specifically reference the course materials or information in any way when commenting on the suggestions they gave, whereas the face-to-face group did this on several occasions, making statements such as, "A suggestion that I made to help this situation is from the class power point today, to create a story from a picture," and, as mentioned above, "After (the instructor's) lesson we decided to put off social stories until after Spring Break because we liked the possible benefits of an emergency kit with the student we had discussed. I came up with the idea to help him during down time."

The face-to-face group also found the materials/information not useful to collaborative discussion more than was reported in the online group. In fact, non-usefulness increased across Weeks One – Three, but decreased again during Weeks Four and Five, remaining at 31% of participants during these weeks. Certainly, the situation presented for discussion may have been unrelated to course materials/information in some groups and during some weeks, whereas it

was more directly related in other groups and during other weeks. Analysis of written reflections, however, indicates that non-usefulness was reported across groups and across all weeks in the face-to-face group.

Statements such as, "This week's article 'Don't Give Up!' didn't help at all with this situation. It dealt more with collaborating and the difficulties that can arise when you work with different types of people," and "This week's article 'Beyond Consumer Advocacy' didn't really tie into the situation that we discussed. This article dealt more with the importance of everyone working with a child with autism sharing similar goals and expectations," suggest that the supplemental articles were less useful in collaborative discussion than the PowerPoint presentations, possibly being useful to participants in other ways, but not helping to problem-solve presented situations. Regardless of the types of materials that were useful or not useful in discussion (PowerPoint versus articles), either way, the online group rarely mentioned their relation to collaborative discussion. However, the online group did often find materials/information personally useful, as indicated in Appendix K (Codes 4.3 and 4.4).

For this aspect of quality collaboration, the nature of the face-to-face format appeared to be more effective overall. Educational institutions who plan to implement professional development in the area of autism may wish to consider how course materials and instruction can relate to participation, synthesis of information (Thompson & Ku, 2006) and dialogue (Gajda & Koliba, 2008). Specifically in an online format, planners of professional development might

consider the possibility of tracking whether or not participants have read the information through assessment or other means.

Discussion - Question 2

How did educators' attitudes toward using technology as a means of collaboration change as a result of participating in face-to-face or online delivery formats in a professional development course in the area of autism? Collaborative learning and problem-solving was a preferred format for all participants at both the start and end of the professional development course, as evidenced by their attitudes on survey questions specifically relating to giving and receiving collaborative assistance. Because attitudes in this area started out positive, participants as a collective group were likely more receptive to collaborative discussions in the professional development course. The pre-survey attitudes of the face-to-face group started out lower than the online group for giving collaborative assistance, but the group increased their positive attitudes to 100% after taking the course. The increase in the face-to-face group's positive attitudes about giving collaborative assistance may have been due to an increase in content knowledge, or a positive experience with collaboration. Additionally, both groups increased positive attitudes about collaborating with colleagues in their area of expertise or other areas of expertise, demonstrating that collaboration with colleagues in either format did move in a positive direction after taking the course. With this in mind, if collaboration is a major goal of a professional development opportunity in the area of autism, planners can at the very least feel

confident that either format may increase or maintain positive attitudes about collaboration.

In general, both the online and face-to-face groups increased positive attitudes in most areas, indicating that the collaborative nature of the professional development course in either format was effective. When surveying attitudes regarding online collaboration, the online group increased positive attitudes about the helpfulness of collaborating in an online format and the efficiency/convenience of online collaboration. No change in attitudes was found for the likelihood of using online collaboration to problem solve future challenges, and the helpfulness of collaborating in an online format supplemented with lecture materials. Additionally, no change in attitudes was found for interest in collaborating with colleagues using asynchronous, online in-service delivery with interactive components. However, positive attitudes began at 100%, allowing no possibility for a positive change. Mostly positive increases or maintained attitudes indicated that the online group thought collaboration in an online format was helpful when problem-solving challenges related to autism. They also thought it was an efficient and convenient method of collaboration, and would likely use it to problem-solve again. However, low percentages post-survey in many areas still indicated that the online format could have been received more positively than it was by online participants. With the exception of interest in collaborating with colleagues using asynchronous online in-service delivery with interactive components, which stayed at 100% from pre- to post-survey, the highest post-survey percentage for questions related to online

140

collaboration was only 75% for the online group, indicating that there were still aspects of collaboration in the online format that were disliked by members of the group. Attitudes surveys revealed that aspects disliked in online collaboration included concepts such as a slower exchange of ideas, lack of physical communication characteristics such as seeing facial expressions and hearing voice inflections, and getting less detailed responses/feedback than a face-to-face setting might provide.

Though the average difference in percentage points surrounding online collaboration increased the same amount in both the online and face-to-face groups, the face-to-face group's post-survey percentages were lower than the online group, which might be expected as they did not participate in an online format, and were generally positive about face-to-face collaboration even at the start of the course. The face-to-face group increased positive attitudes about online collaboration regarding the helpfulness of collaboration in an online format and an online format supplemented with lecture materials and the efficiency/convenience of online collaboration. However, there was still much room for improvement in their attitudes about technology as a means of collaboration overall. Perhaps participating in and gaining experience with the online format may have changed their attitudes.

One of the most interesting findings may be the overall increase in mean percentage points of positive attitudes of the online group, when it came to addressing face-to-face collaboration (an increase of 27.8 percentage points). This group strongly supported face-to-face collaboration indicating that although

they may have been moderately satisfied with technology as a means of collaboration they seemed to also believe that a face-to-face format may have been a very good option for collaboration. It is noteworthy that when comparing similarly worded questions assessing attitudes in either a face-to-face or online format (e.g. questions 3 & 5, questions 4 & 6, questions 8 & 9, and questions 10 & 11), the face-to-face questions produced higher percentages of positive attitudes post-survey almost every time. The only exception was the category of efficiency/convenience, where percentages were slightly higher for the online group, for the efficiency/convenience of online collaboration.

According to Ward, Peters & Shelley (2010), though research shows that online instruction may be just as effective as face-to-face in many areas, there is nevertheless concern regarding the quality of collaboration found in the online environment, even in a synchronous, online environment. Collaborative satisfaction may be lower in an online environment, even when other aspects of the course may be considered effective. Participants in the online professional development course may have felt the same concern about quality collaboration.

The mixed results from this study are in line with literature on comparisons in attitude and satisfaction regarding face-to-face versus online courses (Dillon, Dworkin, Gengler & Olson, 2008; Hauck, 2006; Heale, Gorham & Fournier, 2010; Rovai, Wighting & Lie, 2005). Some individuals prefer face-to-face courses, while others prefer online courses. Though online education is becoming increasingly relevant in education, it is not suited to everyone (Haigh, 2006). The notion of learning style comes into play here (Haigh, 2006), and may

have been a factor in the attitudes of participants in this study, resulting in limited changes in attitudes whether the participants were assigned to the face-to-face or online groups. For example, individuals who are more satisfied overall with the online environment may be more comfortable with communicating electronically, have better access to the Internet, and often report better typing skills, whereas those who are more satisfied with face-to-face environments may be more reliant on class participation to stimulate their interest in a class, and perceive group exercises more favorably (Haigh, 2006). In addition, Zhan, Xu & Ye (2011) suggest that learners may be more active or reflective depending on their learning styles, which may in turn affect perceptions of one environment over the other.

Although individuals may feel positively about online courses, collaboration in these courses is often a more difficult task, and continued research is being conducted into the elements necessary to foster effective collaboration in an online setting (Dillon, Dworkin, Gengler & Olson, 2008; Ritter, Polnick, Fink & Oescher, 2009; Ward, Peters & Shelley, 2010). Statements made by participants in this study regarding the ability to see body language, elaborate on discussions, and get immediate feedback are seen in the literature (Avgerinou & Anderson, 2007), as positive aspects of face-to-face collaboration, and areas that may be worked on in online collaboration.

Summary of Overall Interpretations for Research Questions 1 and 2

Mixed results were found in answering both research questions. Findings regarding quality collaboration revealed that both the face-to-face and online professional development course formats had certain aspects of collaboration that

143

may have been of higher quality in one format over the next. Similarly, changes in attitudes regarding technology as a means of collaboration were limited, but changed in both positive and negative directions, offering mixed results. On average however, attitudes regarding technology as a means of collaboration increased positively by 6.2 percentage points in both groups. Though results are in line with the literature for both research questions, in terms of this study, although there seemed to be more characteristics of quality collaboration in the online group, there seemed to be a more evident satisfaction with face-to-face collaboration overall. While several features of the online environment may foster effective collaboration, satisfaction with the nature of collaboration can vary significantly amongst individuals, based on learning styles (Ward, Peters & Shelley, 2010), and often, collaborative satisfaction is higher in a face-to-face setting (Dillon, Dworkin, Gengler, & Olson, 2008). For the purposes of this study, several additional factors may come into play here including rapport with the instructor (the instructor was a known and respected figure in the school district) and the nature of the professional development course topic (collaboration regarding autism may feel more satisfactory in a face-to-face setting, even when one's situations cannot always be presented). The specific elements of the online course offered may have also come into play. Though the asynchronous method of communicating in an online course is currently the primary mode of delivery in online education (Shi & Morrow, 2006), in synchronous communication students and teacher are able to communicate immediately, without delay (Avgerinou & Anderson, 2007). Perhaps

144

synchronous collaboration, modified collaboration requirements, or more interactive elements may have increased satisfaction with the online course.

In sum, though aspects of quality collaboration may be more evident in one format over another based on participants' interpretations of the types of collaboration that occurred in the course, satisfaction with collaboration in one format over the next may not correlate. Both should be taken into account when attempting to develop environments offering effective collaboration activities for educators working with individuals with autism. Positive attitudes about a situation are more likely to correlate with perceived positive experiences of participants than are perceived elements of quality collaboration that may be included when an instructor is planning a course. Where technology is concerned, using technology as a means of professional development that incorporates collaboration may be an effective means of allowing educators the opportunity to learn and share about autism. With this in mind, professional development planners may wish to consider how they might make changes to an online format to account for various learning styles and take into account variables that affect participant satisfaction.

Implications for Education

Considerable public funds are spent on professional development at the federal, state, and local levels (Hochberg & Desimone, 2010; U. S. Department of Education, 2008). School districts are looking at cost-effective professional development delivery methods, of which an online format may be a good choice now that many school districts have a minimum of one computer per teacher,

145

often in the form of laptop computers that may even be taken home and used at the educator's convenience. If this is the case, perhaps the online environment can be further examined and changes developed so that the aspects of quality collaboration that fare better in a face-to-face environment can be similar in an online environment. For example, how can suggestions given during online collaboration be more readily implemented by participants? In what ways can course developers make sure this aspect of the process is increasingly followed through with so that collaboration is effective, practical and in-depth enough that participants will want to implement suggestions, and will have opportunities to report on implementation and its outcomes?

At the same time, course developers may wish to look at the aspects of collaboration in online versus face-to-face formats that may affect participants' attitudes toward one format or the other, such as body language when socializing, immediacy of feedback, modeling or in-depth explanation of suggestions, convenience, and time factors, all of which were mentioned as either pros or cons of a particular format in the current study. Depending on the format in which professional development is offered, how can developers increase quality characteristics of the format in an attempt to increase positive attitudes? For example, how can developers increase feelings of connectedness in an online format (through body language, immediacy of feedback, etc.), or how can they increase opportunities for participation in a face-to-face format (by incorporating procedures that allow for more time for participants to collaborate)?

Though the effectiveness of an online or face-to-face environment for a particular group may need to be studied on a case-by-case basis, results of this study may be applicable in the development of professional development courses in the area of autism, where collaborating with colleagues is often highly valued and necessary due to the extremely individualized nature of each student with autism (McCabe, 2008). Educational institutions are continuously looking for ways to reach those that work with students with autism, as their university coursework or even their professional experiences may not have adequately prepared them (Hastings & Brown, 2002). Results of this study should add to the literature base, guiding and influencing teacher educators, educational institutions and school districts as they prepare to offer the most effective professional development possible in the area of autism. Though results of this study are mixed overall, there are specific aspects of providing online versus face-to-face professional development and collaboration opportunities in the area of autism that were found, and that may be useful in planning the explicit pieces of a professional development program. Interpreted carefully, results of this study should provide educational leaders a foundation on which to build their professional development courses in terms of collaborating about students with autism.

Limitations

Limitations do exist in the format of this study and its results. As mentioned in Chapter 1, the professional development course was offered to one group of educators, in one school district, for only five weeks. Expansions in any

147

or all of these areas may have provided more data, allowing for the possibility of expanded generalization. Additionally, though groups were randomly assigned, there was not an even number of participants in each group, and participant demographics in each group were not as varied as they could have been. Although both groups started out with basically the same amount of content knowledge about autism and ended with virtually the same amount as indicated in the pre-/post-test (see Appendix C), more randomization in demographics may have produced different characteristics of collaboration.

The nature of the data collection tools and course procedures produced a specific set of data containing semi-formulaic results, as participants were asked to write about certain topics in the reflections, and answer certain questions in the pre- and post-surveys. Modifications to topics in the written reflections or questions in the attitudes surveys may have produced different results. Codes created for weekly written reflections also produced specific data, and may have produced different data if they were modified. Additionally, all participants did not produce data for all data collection opportunities, which affected percentages and made comparisons of data less precise. For example, participants were encouraged to comment on pre- and post-surveys, but several did not, as it was not a requirement.

Future Research

Many characteristics contribute to the collaborative quality seen in a particular group, including factors surrounding participants, instructors, characteristics of the educational institution itself, professional development

content, and professional development formats. Studying the particular characteristics of individuals who prefer online versus face-to-face methods of both content acquisition and collaboration, especially in conjunction with the professional development topic of autism, may be worthwhile. Perhaps both groups may participate in both formats so that they have the opportunity to compare and report their thoughts on each, with less speculation. Additionally, though groups were divided randomly in this study, researchers may wish to purposefully assign groups in a manner that allows for more equal representation of general and special education teachers within each group to determine its effect on participation and perception of quality.

The course might be extended to provide more longitudinal data on the effectiveness of collaboration. Providing the opportunity for participants to participate in the course over a longer period of time may allow researchers to examine relationships that may be built through collaboration. Researchers may also wish to look for a possible change in quality of collaboration over time as an additional method of analysis, analyzing group or even individual participant change.

Furthermore, questions on a pre- and post-survey might be refined to specifically address technology in relation to the specific experiences of either an online or face-to-face group. Questions may be asked that allow for more detailed responses (rather than just "Comments"), such as, "Now that you've participated in an online version of the course, would you recommend an online or face-to-face version of the course to a colleague? Why?" In this way, researchers may be

149

able to ascertain more succinct trends, and come to more precise conclusions about true attitudes. Requirements of the course may also change (in order to earn credit) for gathering written information from participants that will later be analyzed. Requiring participants to produce all necessary data in order to get credit for the course may have changed the results and made analysis more accurate.

Summary

The complex nature of autism spectrum disorders requires educators to learn more about the disorder and the individual characteristics of the students with whom they work (National Research Council, 2001). Professional development opportunities that provide both content and collaboration may be the first step in increasing the possibility for successful education for students with autism. Though individual characteristics of educators exist and no one-size-fits-all approach to professional development is likely, continuing to study the specific pieces of professional development opportunities for autism that foster success and satisfaction, sets the occasion for continuous improvement.

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APPENDIX A

2008 TEACHER SURVEY – PARTICIPANT DEMOGRAPHICS

Teacher Demographics - Focus Group

Informant	Licensure	Teaching Assignment	Gender	State where trained	Years of teaching	Highest Degree Earned	Type of collaborators noted
#1	Elementary K-8; Special Education - SLD	4-6 Resource Teacher	F	AZ	More than 10 years	Master's	Gen Ed, Other SpED, Para, Parents
#2	Special Education – Cross Categorical	Inclusion; SpED dept chair	F	DK	6-10 years	Double Master's	Gen Ed, Para
#3	Elementary Education; Early Childhood	1st grade teacher	F	AZ	More than 10 years	Master's	Special Educator, Para
#4	Learning Disability; Administrative PreK-12	Resource Teacher	F	AZ	6-10 years	Master's	Other SpED, Gen Ed, Para, Parents
#5	Elementary K-8; Cross Categorical	Self-Contained Autism Teacher 2-6	F	CA, AZ	2-5- years	Master's	Gen Ed, Para, Related Services therapists
#6	Elementary K-8	Kdg Teacher	F	AZ	2-5 years	Master's	Reading specialist, Parents, Volunteers in classroom
#7	Secondary 7-12; Administrative PreK-12; Special Education Cross Categorical	Self-Contained Autism Teacher 7-8	F	AZ	2-5 years	Double Master's	None
#8	Special Education Cross Categorical	Self-Contained Autism Teacher 2-6	F	NY, AZ	2-5 years	Master's	Para
#9	Early Childhood	Self-Contained Autism Teacher K-2	F	AZ, OH	First year	Bachelor's	Gen Ed, Para, Volunteers in classroom
#10	Special Education Cross Categorical	Self-Contained Autism Teacher K-2	F	DK	First year	Master's	Para, Related Services therapists
#11	Special Education Cross Categorical, ED, SLD	Resource Teacher K-3	F	MN, AZ	More than 10 years	Master's	Other SpED, Para
#12	Early Childhood; Special Education Cross Categorical	Self-Contained Autism Teacher, elementary	F	OH	2-5 years	Master's	Gen Ed, Para, Parents
#13	Special Education Cross Categorical	Self-Contained Autism Teacher 2-6	F	UT	2-5 years	Bachelor's	Para, Parents
#14	Elementary K-8; Special Education SLD	Self-Contained Autism Teacher 1-6	F	AZ	2-5 years	Master's	Gen Ed, Other SpED, Para, Related Services

							therapists
#15	Special Education SLD, MR	Elementary Resource Teacher	F	VA	More than 10 years	Bachelor's	Gen Ed, Other SpED, Para
#16	Administrative PreK-12; Special Education SLD, MR, OI, Severe & Profound	Self-Contained Autism Teacher, elementary	F	DK	16 years	Master's	Gen Ed, Other SpED
#17	Elementary K-8; Special Education ED, SLD	Elementary Resource Teacher	F	PA	More than 10 years	Master's	Gen Ed, Other SpED, Para
#18	Elementary K-8	2nd grade teacher	F	IL, AZ	2-5 years	Bachelor's	None
#19	Elementary K-8; Secondary 7-12	3rd grade teacher	F	AZ	More than 10 years	Master's	Reading specialist
#20	Elementary K-8; Early Childhood	Primary elementary teacher	F	PA, WV	More than 10 years	Master's	SpED Teacher, Para, Volunteers in classroom
#21	Elementary K-8; Special Education SLD	Special Education Resource teacher	F	AZ	6-10 years	Master's	Gen Ed, Parents

Note. Reprinted from McCoy, K. M., Gehrke, R., & Bruening, M. D. (2009).

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APPENDIX B

WHAT TEACHERS NEED TO KNOW – INFORMATION FROM FOCUS

GROUP

Focus Group Data

Areas mentioned	Comments
"What teachers need to know"	**Adaptations** Their relationship to the autism Who is responsible for them Knowing them ahead of time Easy to use, checklist format, no narratives How far to push their students What do I let go? Academics? Behavior? Social? What % Types that work around "motivation" **Critical elements of the IEP** 3 things – present levels, goals, accommodations Goals and objectives bank specific to ASD, not just general "KWL" of what student is expected to know and be able to do A list of triggers to that child A summary, easy read, from previous teacher, "at a glance" **Collaboration** Meet me at the door first day From teacher from last year, what worked "the teacher piece", no offense to specialists Ask me 5 specific, leading questions each month, not just "how is it going" for your PLAAFT
"What would help teachers to work with and improve performance of the student with HFA/AS in general education classrooms"	**Attending seminars and conferences** With breakout sessions for age, medical info, specific topics With specific tricks to use Give resources, websites, assessment or templates to use Tells what works and doesn't Has books or materials to buy from the author/presenter Can meet other teachers with same need Get a different point of view from someone outside school Going with teacher colleagues together Go to one before you have a student **"No" to an online class?** Want to hear others' stories, not just read Personal interaction Like going to school Need Q&A, interaction, discussion piece Need walk through techniques, models, see what to do **Hands on training format and what kind of specialists for trainers?** Sensory motor, sensory diet Uses of videotaping in classroom Class specific, like for handwriting Through the district In the classroom Involve parents as trainers
"What assistance from another professional or training particular to the school setting and in the district"	**What that looks like** Before a student starts with you Train everyone at the school – all elective teachers, administrator on behavior Train all support staff, cafeteria, campus aides, bus drivers Train peers to work with the students with ASD, train kids to

	work with other kids More than tolerance training More than one time, on-going, an hour now and more next month, break it up Give it when it is needed, here is a student – here's your seminar – go!

Note. Reprinted from McCoy, K. M., Gehrke, R., & Bruening, M. D. (2009).

Unpublished data. Reprinted with Permission.

APPENDIX C

SCORES ON PRE-/POST-TEST (AUTISM CONTENT KNOWLEDGE)

Pre-/Post-Test Scores

	Participant	Online – Pre Score (Out of 23)	Online – Post Score (Out of 23)	Participant	F2F – Pre Score (Out of 23)	F2F - Post Score (Out of 23)
	Participant 1	18	20	Participant 1	16	22
	Participant 2	13	19	Participant 2	19	22
	Participant 3	16	17	Participant 3	18	20
	Participant 4	18	20	Participant 4	17	18
	Participant 5	14	20	Participant 5	17	18
	Participant 6	15	21	Participant 6	17	19
	Participant 7	16	19	Participant 7	17	18
	Participant 8	19	19	Participant 8	12	17
	Participant 9	12	18	Participant 9	15	18
	Participant 10	16	16	Participant 10	14	21
				Participant 11	13	18
				Participant 12	16	19
				Participant 13	13	19
Average Raw Score		15.7	18.9		15.7	19.2
Percent Correct		68%	82%		68%	83%

Note. F2F = Face-to-Face.

APPENDIX D

WEEKLY REFLECTION RUBRIC AND DISCUSSION PROCEDURES

Professional Development Class – "Autism and Adaptations – What do teachers need to know?"

Collaborative Problem Solving Discussion and Reflection Purpose

To participate in collaborative problem solving targeting a problem or potential problem for a specific student on the Autism Spectrum, or a particular situation involving student(s) on the Autism Spectrum.

General Directions

Discussion:

Discussion will be held over specific challenges faced by you and your colleagues when providing services for children and youth on the Autism Spectrum. A reading schedule for supplemental articles used to support the discussion will be posted online. Two parts of this discussion occur. *Part 1* is to describe a situation in which you would like input from your colleagues, instructor or other experts, relating to content from this week's class and article(s) as much as possible. *Part 2* is to provide your insights to one or more of your colleagues in class for their challenges in providing services to children and youth who are on the Autism Spectrum.

Through discussion with your classmates and instructor (or other experts), collaborate and problem solve about a specific student or situation that you want to address. In your discussion, try to develop a strategy or idea for solving the challenges you have with the student or situation. If feasible, attempt to implement the strategies or ideas advised into your own classroom/situation.

Your contribution to the collaborative problem solving discussion is due on or before the next course meeting, but preferably earlier in the week in order to effectively address challenges, collaborate, implement ideas and reflect by the next class.

Reflection:

Your participation for the research and development component of the course includes completing a written reflection addressing the challenges you and your classmates have raised relative to a particular student or situation, collaborative techniques used to problem solve relative to particular students or situations, effectiveness of collaborative techniques, and how course content and articles did or did not help you to collaborate. You must address the components of the Reflection Rubric in order to get credit for the reflection. If the components are not addressed, the reflection may need to be resubmitted.

In **face-to-face** formats, you
- are asked to bring the weekly article to class either as a hard copy or on your laptop.
- will hold the discussion in class.
- are asked to collaborate regarding a minimum of one challenge faced by your colleague but may address as many of your colleagues as you wish.
- are encouraged to take notes during the discussion to help you address the components of the reflection assignment rubric
- are asked to produce a 1-2 page narrative responding to challenges raised in the discussion, and collaborative techniques used to solve these challenges, and submit to the instructor/researcher.
- complete the reflection assignment either in class or if time is needed outside of class.

In **online** formats, you
- are asked to enter the discussion any time prior to the next class, but preferably earlier in the week in order to effectively address challenges, collaborate, implement ideas and reflect by the next class
- are asked to post your contributions online at a time convenient for your schedule prior to the next class but preferably earlier in the week in order to effectively address challenges, collaborate, implement ideas and reflect by the next class
- are asked to collaborate regarding a minimum of one challenge faced by your colleague but may address as many of your colleagues as you wish.
- are asked to produce a 1-2 page narrative responding to challenges raised in the discussion and collaborative techniques used to solve these challenges and submit to the instructor/researcher.

Please use the rubric below to guide your 1-2 page reflection (please do not go over 2 pages). ***Please address each area of the rubric thoroughly, as these descriptions will be analyzed for research purposes.***

Week and Article	Thoroughly describe one or more situations or challenges brought up in this week's discussion.	Thoroughly describe how you collaborated with classmates in the discussion to problem solve as related to these situations or challenges, **including** information on both your collaborative contribution and their collaborative contributions.	Thoroughly describe how collaboration with classmates in the discussion helped you to problem solve and intervene regarding your own situation, **including** how useful you feel collaboration with classmates was in helping you to do so.	Thoroughly describe how what you and your classmates learned through course content and articles was useful in collaborative problem solving. *(If information from course content and articles was not useful, please be sure to describe this too, **including why** you feel it was not useful.)*
Week 1 Article:				
Week 2 Article:				
Week 3 Article:				
Week 4 Article:				
Week 5 Article:				

APPENDIX E

PRE-/POST-TEST AND SURVEY

Professional Development
Autism and Adaptations
Spring 2011
PRE/POST-TEST AND SURVEY

Name: _____

Date:_____

Group (Online or Face to Face):

_____

Directions: Circle the correct answer to each question.

1. An example of impaired theory of mind would be:

   a. Inability to realize that someone else may not like chocolate as much as you do.
   b. Inability to recall what you did over the weekend.
   c. Inability to imitate what your peer is doing.
   d. Inability to recognize an icon for "sad".

2. A story that explains a situation, including what is involved in the situation itself, as well as how to act in that situation, is called a:

   a. Positive Behavior Story
   b. Social Story
   c. Advanced Preparation Story
   d. Situational Story

3. A calming sequence is an adaptation used for:

   a. Helping students to discuss anxious emotions
   b. Helping students to take the emotional perspective of another person who appears anxious
   c. Helping students to regulate their own emotions
   d. Helping students tell an adult when they need a break

4. One example of a strategy for helping a student who is under responsive in the area of tactile sensitivity is:

   a. Have the student wear a weighted vest
   b. Have the student hold a cold item
   c. Have the student sit on a therapy ball
   d. Have the student eat vanilla pudding

178

5. One example of a strategy for helping a student who is over responsive in the area of vestibular sensitivity is:

    a. Prepare the student in advance for a fire drill
    b. Allow the student to jump on a trampoline
    c. Have the student listen to quiet music
    d. Have the student push a heavy cart

6. The most important act you should do before deciding on an IEP goal or objective is to:

    a. Invite the student's parents to an IEP meeting
    b. Collect data on the student's current skills
    c. Ask the school psychologist to conduct a re-evaluation
    d. Ask past teachers for the student's grades

7. One role of a paraprofessional might be to:

    a. Make decisions about curricula for a student
    b. Observe and record student behaviors
    c. Discuss the student's diagnosis of autism with the student's peers
    d. Run an IEP meeting if s/he is a one-on-one aide for the student

8. Which of the following is NOT a usual characteristic of Autism Spectrum Disorders?

    a. Restricted Interests
    b. Social Deficits
    c. Physical Abnormalities
    d. Communication Difficulties

9. When is autism evident in most children?

    a. At birth
    b. At 18 – 36 months
    c. When a student enters school
    d. After receiving his/her fourth round of vaccines

10. If a student with autism appears distressed in the classroom, the teacher may want to:

    a. Be sure all items of interest to the student are inaccessible until school work is completed.
    b. Refrain from telling the student about changes in routine, so as not to stress the student out.
    c. Check for any distinct triggers that may be bothering the student in the classroom.
    d. Visually or verbally remind the student that s/he needs to behave.

11. One of the most widely-used adaptations to assist individuals with autism are:

    a. Verbal Descriptors
    b. Visual Cues
    c. Instructional Songs
    d. Augmentative Communication

12. The automatic repetition of vocalizations made by another person is called:

    a. Repetitive Talk
    b. Mimicry
    c. Echolalia
    d. Imitative Response

13. One noticeable difference between individuals with autism and typically developing individuals is:

    a. Individuals with autism do not usually show affection
    b. Individuals with autism are usually better at mathematical concepts
    c. Individuals with autism often have restricted interests
    d. Individuals with autism are hyperlexic

14. Hand-flapping is usually thought of as a type of:

    a. Communicative behavior
    b. Self-stimulatory behavior
    c. Socially acceptable behavior
    d. Anxiety producing behavior

15. If the teacher points up at the sky during a lesson on weather, expecting the students to look up, and a student with autism does not look up at the sky, most likely s/he has difficulties with:

    a. Joint Attention
    b. Social Understanding
    c. Theory of Mind
    d. Mindblindness

16. Deficits in pragmatics may cause a student with autism to:

    a. Continuously interrupt others
    b. Cover their ears when hearing the fire alarm
    c. Mispronounce words
    d. Tease other children in the classroom

17. One of the best ways to help ease anxiety of students with autism is to:

    a. Have a class schedule that incorporates only activities appealing to the student
    b. Have a flexible class schedule that changes frequently
    c. Inform the student's parents daily about what the schedule for the day included
    d. Have a consistent class schedule with minor changes

18. One way to decrease problem behaviors is to:

    a. Allow students a choice of activities
    b. Be sure to allow plenty of down time
    c. Limit social interactions during educational activities
    d. Choose when the students can have a break

19. Which of the following does NOT often co-occur with autism?

    a. ADHD
    b. Obsessive Compulsive Disorder
    c. Dyslexia
    d. Anxiety

20. Interventions for individuals with autism should always be:

    a. Initiated by the parent
    b. Scientifically based
    c. Based on a specific model of instruction
    d. Modeled on general education standards

21. Collaboration is most effective when collaboration is:

    a. With professionals in your same area of expertise
    b. With professionals in different areas of expertise
    c. Based on using methods found in professional journals
    d. Based on using methods that your principal has used

22. Individuals with autism **most often** demonstrate deficits in:

    a. Decision making
    b. Social reciprocity
    c. Looking appropriate
    d. Responding to questions

23. Which of the following is **NOT** often associated with autism?

    a. Sleep problems
    b. Atypical eating patterns
    c. Hearing irregularities
    d. Difficulty with executive function

Part II: Attitudes related to collaboration when addressing the needs of students with autism

1. How helpful do you find collaboration with colleagues within your area of expertise when addressing the needs of students with autism (e.g. if you are a special education teacher, how would you rate your collaborative experiences with other special education teachers)?

2. How helpful do you find collaboration with colleagues in other areas when addressing the needs of students with autism expertise (e.g. if you are a special education teacher, how would you rate your collaborative experiences with general education teachers, administrators, etc.)?

3. How helpful do you find collaboration with colleagues in a face to face setting when addressing the needs of students with autism?

4. How helpful do you find collaboration with colleagues when addressing the needs of students with autism in a face to face setting supplemented with lecture materials (e.g. if you are taking a course)?

5. How helpful do you find collaboration with colleagues when addressing the needs of students with autism in an online format?

6. How helpful do you find collaboration with colleagues when addressing the needs of students with autism in an online format supplemented with lecture materials (e.g. if you are taking a course).

7. How often do you implement new ideas and strategies addressing the needs of students with autism within your own professional work after collaborating with colleagues?

8. How efficient/convenient do you find face to face collaboration with colleagues when addressing the needs of students with autism?

9. How efficient/convenient do you find online collaboration with colleagues when addressing the needs of students with autism?

10. How likely would you be to use online collaboration to problem solve your own professional challenges when addressing the needs of students with autism in the future?

11. How likely would you be to use face to face collaboration to problem solve your own professional challenges when addressing the needs of students with autism in the future?

12. How do you feel about collaborating with colleagues using asynchronous online in-service delivery which provides interactive components, e.g., discussion groups when addressing the needs of students with autism?

13. How likely are you to seek collaborative assistance from your colleagues for your own professional challenges when addressing the needs of students with autism?

14. How likely are you to give collaborative assistance to your colleagues for their professional challenges when addressing the needs of students with autism?

15. Overall, I would rate collaboration with colleagues regarding professional challenges when addressing the needs of students with autism to be:

APPENDIX F

SCHOOL DISTRICT COURSE ADVERTISEMENT

Course description: District Professional Development

Spring 2011
Course Description

"Autism and Adaptations - What do teachers need to know?"

This class will provide information for district staff who have/had/will have students with high functioning autism in their classrooms/programs. Topics will include:

Characteristics of Autism Spectrum Disorders,
Adaptations for Communication/Social/Sensory Deficits,
What IEP's say about students, and
How to Collaborate with others who have your student.

The class is part of a research and development project and will be offered in face-to-face and optional online formats.

Audience: general and special education resource teachers - K-12
15 hours

APPENDIX G

SUPPLEMENTAL ARTICLES

Week One Article:

Barnhill, G. P. (2001). What is asperger syndrome? *Intervention in School and Clinic, 38*(5), 258 – 265.

Week Two Article Choices:

Simpson, R. L., McKee, M. Teeter, D. & Beytien, A. (2007). Evidence-based methods for children and youth with autism spectrum disorders: Stakeholder issues and perspectives. *Exceptionality, 15*(4), 203 – 217.

Tincani, M. (2007). Beyond consumer advocacy: Autism spectrum disorders, effective instruction, and public schools. *Intervention in School and Clinic, 43*(1), 47 – 51.

Week Three Article Choices:

Cramer, S. & Stivers, J. (2007). Don't give up: Practical strategies for challenging collaborations. *Teaching Exceptional Children, 39*(6), 6 – 11.

Stoner, J. B., & Angell, M. E. (2008). Parent perspectives on role engagement: An investigation of parents of children with ASD and their self-reported roles with education professionals. *Focus on Autism and Other Developmental Disabilities, 21*(2), 177 – 189.

Witbread, K. M., Bruder, M. B., Fleming, G. & Park, H. J. (2007). Collaboration in special education: Parent professional training. *Teaching Exceptional Children, 35*(4), 6 – 14.

Week Four Article Choices:

Fish, W. W. (2008). The IEP meeting: Perceptions of parents of students who receive special education services. *Preventing School Failure, 53*(1), 8– 14.

Lee-Tarver, A. (2006). Are individualized education plans a good thing? A survey of teachers' perceptions of the utility of IEPs in regular education settings. *Journal of Instructional Psychology, 33, (4), 263 – 272.*

Wilczynski, S. M., Menousek, K., Hunter, M., & Mudgal, D. (2007). Individualized education programs for youth with autism spectrum disorders. *Psychology in the Schools, 44*(7), 653 – 666.

Week Five Article:

Giangreco, M. F., Smith, C. S., & Pinckney, E. (2006). Addressing the
paraprofessional dilemma in an inclusive school: A program description.
*Research and Practice for Persons with Severe
Disabilities, 31*(3), 215 – 229.

APPENDIX H

WEEKLY WRITTEN REFLECTIONS CODING SYSTEM 1

SEEKING ASSISTANCE/COLLABORATION IN REFLECTION
Seeking help/explanation
Seeking comment/critique
CONTRIBUTIONS/COLLABORATION
Self-Thinking/elaboration as a result of collaboration
Others contributed to a situation/problem
Disagreed with suggestion
Agreed with suggestion
Ineffective suggestions
Effective suggestions
Instructor contributed idea
Contributed to others
Had experience with another's situation
Gave few suggestions
Gave many suggestions
Others implemented their suggestions
Others contributed to them
Effective/helpful contributions
Ineffective/non-helpful contributions
Many contributions received
Few contributions received ("not enough")
Agree with contribution
IMPLEMENTATION OF SUGGESTIONS
Collaboration helped classroom/situation
Able to implement suggestions
Implemented suggestions ineffective
Implemented suggestions effective
Unable to implement suggestions
May implement suggestions in the future
Will implement suggestion in the future
TIME EFFICIENCY
Discussed situation with another classmate
Classmate UNABLE to bring up situation
Classmate ABLE to bring up situation
ABLE to bring up OWN situation
UNABLE to bring up OWN situation
PROFESSED EFFICACY OF COLLAB.
Professed effective/helpful collaboration
Professed ineffective collaboration
MATERIALS
Class materials/info HELPFUL
Class materials/info NOT helpful

Used materials/info from class to help with collaboration
Self-thinking/elaboration as a result of materials/info

APPENDIX I

WEEKLY WRITTEN REFLECTIONS CODING SYSTEM 2

CONTRIBUTIONS/COLLABORATION
Self-Thinking/elaboration as a result of collaboration
Writer did not give any contributions
No contributions received
No contributions given by anyone
Instructor contributed idea
Lack of experience = Others unable to contribute
Lack of experience = Unable to contribute to others
Others contributed to a situation/problem
Other(s) had similar experiences
Agreed with suggestion
Disagreed with suggestion
Professed effective/helpful suggestions
Professed ineffective/non-helpful suggestions
2 or more suggestions given
Only 1 suggestion given
Contributed to others
Had experience with another's situation
Only 1 suggestion given
2 or more suggestions given
Others implemented their suggestions
Others contributed to them
Other(s) experienced similar situation
Agree with contribution
Disagree with suggestion
Professed effective/helpful contributions
Professed ineffective/non-helpful contributions
2 or more suggestions given
Only 1 suggestion given
IMPLEMENTATION OF SUGGESTIONS
Collaboration helped classroom/situation
Able to implement suggestion(s)
Implemented suggestion(s) ineffective
Implemented suggestion(s) effective
Unable to implement suggestion(s) at this time
Do not have students/situation to implement suggestion(s)
Not enough time to implement suggestion(s)
May implement suggestion(s) in the future
Will implement suggestion(s) in the future
Unwilling to implement suggestions
MATERIALS
Class materials/info did NOT contribute to collaboration

Class materials/info HELPFUL
Class materials/info NOT helpful
Used materials/info from class to help with collaboration
Self-thinking/elaboration as a result of materials/info
OUTLIER-Reflection not useful/did not answer intended question
PROFESSED EFFICACY OF COLLAB.
Professed effective/helpful collaboration
Professed ineffective collaboration
SEEKING ASSISTANCE/COLLABORATION IN REFLECTION
Seeking help/explanation
Seeking comment/critique(explained what they had ALREADY tried)
TIME EFFICIENCY
Professed not much time to collaborate
Only one situation/challenge was discussed
More than one situation/challenge was discussed
Classmate UNABLE to bring up situation
Classmate ABLE to bring up situation
ABLE to bring up OWN situation
UNABLE to bring up OWN situation

APPENDIX J

PARTICIPANT DEMOGRAPHICS

Current Teaching Positions of Participants, Number of Years Teaching, and Number of Years Working with Children with Autism – Online Group

Partici-pant	Current Teaching Position	Number of Years Teaching	Number of Years Working with Children with Autism
1	Special Education: Resource Grades 4 - 6	9	9
2	General Education: Language Arts Grade 8	25	25
3	General Education: Kindergarten	7	10
4	Special Education: Self-Contained (Grade not specified)	4	4
5	Special Education: Resource (Grade not specified)	4	6
6	General Education: Grade 2	4	4
7	Special Education: Learning Disabilities Grade 8	10	7
8	Special Education: Resource Grades K – 3	3	5
9	General Education: Kindergarten	5	2
10	General Education: Grade 3	4	5

Current Teaching Positions of Participants, Number of Years Teaching, and
Number of Years Working with Children with Autism – Face-to-Face Group

Partici- pant	Current Teaching Position	Number of Years Teaching	Number of Years Working with Children with Autism
1	General Education: Grade 4	15	1
2	General Education: General Music Grades K-6	12	10
3	General Education: General Music Grades K - 6	9	3
4	General and Special Education: General/Adaptive Music Grades K- 12	17	17
5	General Education: Kindergarten	9	6
6	General Education Grade 6	11	11
7	School Counselor	25	25
8	General Education: Kindergarten	5	1
9	General Education: Grade 3	11	2
10	General Education: World Languages Grades 9 – 12	14	2.5
11	General Education: Grade 2	13	0
12	General Education: Language Arts Grade 7	28	8
13	General Education Science Grade 7	19	Unsure

APPENDIX K

NUMERICAL DATA FOR WRITTEN REFLECTIONS

Numerical Data for Written Reflection Code 1

Code	Week 1		Week 2		Week 3		Week 4		Week 5	
	F2F	O	F2F	O	F2F	O	F2F	O	F2F	O
1.1 Writer presented own situation to colleagues	7	7	5	10	4	8	4	8	6	8
	54%	70%	38%	100%	31%	89%	31%	80%	46%	89%
a. Academic	2	1	0	3	2	1	1	1	2	2
	15%	10%	0%	30%	15%	11%	8%	10%	15%	22%
b. Behavioral	1	5	2	7	1	5	3	4	3	5
	8%	50%	15%	70%	8%	56%	23%	40%	23%	56%
c. Social	3	4	3	2	0	2	0	1	1	0
	23%	40%	23%	20%	0%	22%	0%	10%	8%	0%
d. Sensory	1	2	0	1	1	1	1	1	0	0
	8%	20%	0%	10%	8%	11%	8%	10%	0%	0%
e. Speech/ Language	0	1	0	0	0	0	0	1	1	0
	0%	10%	0%	0%	0%	0%	0%	10%	8%	0%
f. Other	2	1	1	3	0	0	0	1	0	2
	15%	10%	8%	30%	0%	0%	0%	10%	0%	22%
1.2 Same situation as a prior week	0	0	1	1	4	0	1	0	5	0
	0%	0%	8%	10%	31%	0%	8%	0%	38%	0%
1.10 Writer did not present own situation	6	2	7	0	6	1	9	2	5	1
	46%	20%	54%	0%	46%	11%	69%	20%	38%	11%

Note. F2F = Face-to-Face, O = Online.

200

Numerical Data for Written Reflection Code 2

	Week 1		Week 2		Week 3		Week 4		Week 5	
Code	F2F	O	F2F	O	F2F	O	F2F	O	F2F	O
2.1 Discussion did help writer's situation/ knowledge	8 62%	8 80%	4 31%	8 80%	5 38%	5 56%	2 15%	5 50%	6 46%	4 44%
2.2 Discussion did not help writer's situation/ knowledge	3 23%	1 10%	1 8%	1 10%	0 0%	2 22%	0 0%	3 30%	0 0%	0 0%
2.3 Not enough time to collaborate	7 54%	2 20%	1 8%	0 0%	2 15%	0 0%	1 8%	0 0%	1 8%	0 0%
2.4 Suggestion was given to writer	5 38%	7 70%	4 31%	8 80%	5 38%	8 89%	3 46%	7 70%	4 54%	4 44%
2.5 Suggestion was not given to writer	2 15%	0 0%	1 8%	1 10%	0 0%	0 0%	0 0%	1 10%	0 0%	0 0%
2.6 Suggestions were implemented	0 0%	0 0%	2 15%	1 10%	5 38%	0 0%	5 38%	0 0%	1 8%	1 11%
a. Effective	-	-	0 0%	1 10%	2 15%	-	3 23%	-	1 8%	Not spec.
b. Ineffective	-	-	2 15%	0 0%	1 8%	-	2 15%	-	0 0%	Not spec.
2.7 Suggestions were not implemented	1 8%	0 0%	0 0%	1 10%	2 15%	2 22%	2 15%	2 20%	0 0%	0 0%
2.8 Suggestions may be implemented	3 23%	4 40%	1 8%	5 50%	5 38%	5 56%	4 31%	5 50%	3 23%	6 67%

Note. F2F = Face-to-Face, O = Online, Not spec. = Not specified.

Numerical Data for Written Reflection Code 3

	Week 1		Week 2		Week 3		Week 4		Week 5	
Code	F2F	O	F2F	O	F2F	O	F2F	O	F2F	O
3.1 Writer did provide contribution	8 62%	5 50%	8 62%	9 90%	9 69%	9 100%	11 85%	9 00%	8 62%	4 44%
3.2 Writer did not provide contribution	2 15%	0 0%	1 8%	0 0%	0 0%	0 0%	0 0%	0 0%	1 8%	0 0%
3.3 Similar situations experienced by group members	3 23%	6 60%	1 8%	2 20%	3 23%	5 56%	3 23%	4 40%	1 8%	3 33%
3.10 Colleague's situation not mentioned	5 38%	2 20%	4 31%	1 10%	2 15%	0 0%	2 15%	0 0%	1 8%	2 22%

Note. F2F = Face-to-Face, O = Online.

Numerical Data for Written Reflection Code 4

	Week 1		Week 2		Week 3		Week 4		Week 5	
Code	F2F	O	F2F	O	F2F	O	F2F	O	F2F	O
4.1 Materials/Info. useful in collaborative discussion	2 15%	2 20%	5 38%	0 0%	4 31%	0 0%	7 54%	0 0%	1 8%	0 0%
4.2 Materials/Info. not useful in collaborative discussion	1 8%	1 10%	4 31%	0 0%	5 38%	0 0%	4 31%	0 0%	4 31%	0 0%
4.3 Materials/Info. useful to writer	12 92%	6 60%	6 46%	9 90%	11 85%	8 89%	8 62%	9 90%	8 62%	7 78%
4.4 Materials/Info. not useful to writer	3 23%	2 20%	3 23%	0 0%	2 15%	0 0%	1 8%	3 30%	2 15%	1 11%

Note. F2F = Face-to-Face, O = Online.