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Improving Student Relatedness Through An Online Discussion Intervention: The Application Of Self-Determination Theory In Synchronous Hybrid Programs

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IMPROVING STUDENT RELATEDNESS THROUGH AN ONLINE DISCUSSION INTERVENTION: THE APPLICATION OF SELF-DETERMINATION THEORY IN SYNCHRONOUS HYBRID PROGRAMS

by

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This dissertation, submitted by Nikolaus Theodor Butz in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

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Title Improving Student Relatedness Through an Online Discussion Intervention: The Application of Self-Determination Theory in Synchronous Hybrid Programs

Department Teaching and Learning

Degree Doctor of Philosophy

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Nikolaus Theodor Butz
March 2, 2015

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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To my mother, Michelle, and my father, Rolf.

You taught me the importance of education and

encouraged me to reach my most ardent goals.

ABSTRACT

Students' feelings of relatedness (i.e., feeling connected to others) are crucial for success in both asynchronous and synchronous learning environments; however, courses taught in these formats often limit relatedness development, either by removing spontaneous interaction (e.g., asynchronous delivery) or by introducing seemingly incompatible online and on-campus factions (e.g., synchronous delivery). As such, it was hypothesized that the strengths of one delivery mode could offset the weaknesses of the other. The purpose of this study was to implement and evaluate an online discussion board intervention designed to scaffold relatedness development. Deci and Ryan's (1985) self-determination theory (SDT) was adopted as the theoretical framework as it explicitly addresses the role of relatedness in achievement settings.

Participants were 83 graduate students enrolled in synchronous hybrid programs offered at a large midwestern research university. This study used a convergent parallel mixed methods approach (QUAN + qual = triangulation). The methods involved a pretest-posttest experimental design in which students were randomly assigned to either the experimental group (n = 41), wherein they participated in the intervention, or the control group (n = 42), wherein they attended classes without any auxiliary interactions. Data analysis involved a battery of statistical tests performed on quantitative survey data and a thematic synthesis of participants' responses to open-ended, qualitative survey items.

The results indicated that students who participated in the intervention improved their self-efficacy for developing relatedness with individuals in the online attendance mode. The intervention also mitigated previously observed differences in relatedness between online and on-campus students. The qualitative analysis generated three key themes (relatedness beliefs, program delivery, and student-interface interaction), which were summarized into one assertion: Relatedness development in synchronous hybrid courses requires a dynamic mix of nutriments that can be satisfied or thwarted differently for every student.

This study holds implications for practice in that the results suggest a viable path for improving students' educational experience in synchronous hybrid courses. The results also supported the tenability of SDT for future research in this area. Ideally, explicating the link between relatedness and success will help practitioners design relatedness-supportive interventions that may improve student performance in synchronous hybrid programs.

CHAPTER I

INTRODUCTION

The challenge of disseminating information from a local teacher to a distant student has existed in education for many years. As early as the 12th century, Genghis Khan commissioned horsemen called "arrow riders" to deliver "mobile learning" to the citizens that inhabited the outlying regions of the Mongol Empire (Baggaley, 2008, p. 42). Today, the Internet has made it possible for postsecondary institutions to offer courses through a variety of technology-rich learning environments (TREs) that enable the delivery of information in both asynchronous and synchronous formats. Students' feelings of relatedness (i.e., feeling connected to others) are crucial for success in TREs; however, courses taught in these emerging formats often limit relatedness development. In particular, asynchronous course delivery systems provide pedagogical freedom from space and time, albeit at the cost of a decrease in human interaction, and sometimes, the loss of a sense of academic community (Kruger, 2000). In contrast, synchronous formats offer real-time communication between mutually exclusive groups of online and on-campus students using web-conferencing technology; however, students in these courses often perceive their interactions as being limited by the incompatibility of their divergent attendance modes (Glazer & Wanstreet, 2011). Accordingly, the limitations of asynchronous and synchronous formats have led to attrition rates that are often 10 – 20% higher than traditional courses (Shaik, 2009).

Although many researchers have examined asynchronous learning environments, few studies have focused on synchronous hybrid programs, and combinations of the two paradigms are exceptionally rare. The issue of limited relatedness development in TREs also remains largely unaddressed. Using a self-determination theory (SDT) perspective (Ryan & Deci, 2000), the present study examined how participation in an asynchronous online discussion intervention affected students' feelings of relatedness and self-efficacy for relatedness development in synchronous hybrid learning environments.

Need for the Study

The physical classroom has long been the traditional learning environment in higher education; however, attending classes on-campus is no longer ideal for many contemporary students who are bound by work, family, or geography (Bocchi, Eastman, & Swift, 2004). The traditional, brick and mortar model of higher education is not correctly positioned to accommodate the growing need for flexible course options. Consequently, many universities have adopted various forms of asynchronous and synchronous TREs in order to improve student access (Butner, Smith, & Murray, 1999).

Although the evolution of course delivery options has liberated education from the constraints of space and time (Collins & Berg, 1995; Picciano, 2001), feelings of isolation remain a major issue in TREs (Glazer & Wanstreet, 2011). Specifically, Vrasidas and Zembylas (2003) found that the lack of body language, facial expressions, and gestures in asynchronous programs are significant contributors to the feelings of isolation that students often experience. Indeed, learning online can be a lonely and frustrating endeavor when social interactions are limited by the communication capabilities of the course delivery system (Williams, Duray, & Reddy, 2006). Ryan and

Deci (2000) postulated that positive interpersonal experiences engender feelings of relatedness, which foster well-being in achievement settings such as TREs. Thus, future mentions of affiliation (belongingness or community) and social interactions (connections or relationships) are used interchangeably with relatedness.

Decades before the widespread adoption of online learning paradigms, Moore (1973) argued that the evolution of distance education was largely contingent on the development of social support systems. Wankel and Blessinger (2012) asserted that humans have an innate need to socialize, belong, and communicate, and therefore, tools that support peer interaction are essential for student success in TREs. To date, however, social supports have not been equitably researched in synchronous and asynchronous modalities. In a recent review of the literature, Hrastinski and Keller (2007) confirmed that 82% of the articles published on TREs over a five year period focused on asynchronous programs.

Despite the disproportionate emphasis on asynchronous delivery, some researchers believe that the strengths of one delivery mode may be used to offset the weaknesses of the other. For example, Hrastinski, Keller, and Carlsson (2010) suggested that both synchronous and asynchronous communication systems could be used in concert with one another to create a socially nurturing TRE. The present study sought to examine the effects of implementing an asynchronous online discussion intervention in established synchronous hybrid programs.

Evolution of the Current Program of Research

While interest in exploring key success factors for student performance in postsecondary TREs has gained momentum in educational research at large, the principal

investigator became personally interested in this topic as a result of his experiences as a student and a teaching assistant in a synchronous hybrid program. Through this exposure to both sides of the teaching and learning paradigm, the principal investigator became intimately aware of the complex social dynamics involved in synchronous hybrid delivery—namely, the divergent patterns of interaction among online and on-campus synchronous hybrid students.

Given this perspective, the principal investigator began empirically studying the synchronous hybrid learning environment during the Spring 2013 semester. The goal of the first exploratory study was to establish an initial data point representing the social context of this emerging delivery mode. Accordingly, for Year 1 the principal investigator quantitatively measured a wide variety of factors that are commonly associated with student achievement. The results of this cross-sectional exploratory study revealed that students who attended synchronous hybrid courses online reported significantly lower levels of relatedness than those who attended on-campus; that is, online students felt less connected to their classmates. This intriguing finding was presented at the 2014 American Educational Research Association annual meeting and appear in an article published in the *Journal of Online Learning and Teaching* (Butz, Stupnisky, Peterson, & Majerus, 2014).

After it was determined that relational deficiencies were a significant area of concern for synchronous hybrid programs, the principal investigator decided to continue his program of research by implementing a more robust, mixed methods longitudinal study design. The goal of the Year 2 study was to gain a better understanding of how relatedness developed in synchronous hybrid learning environments. Commensurate with

the findings from Year 1, quantitative survey data collected at three time points during Year 2 revealed that self-reported relatedness scores were consistently lower for online students than on-campus students. Year 2 of this program of research also generated qualitative data from interviews with students and faculty members. The themes that emerged from these data corroborated the quantitative findings and provided additional insight regarding the influence of attendance mode on relatedness development. To this end, it was found that students of opposite attendance modes tend to avoid developing relatedness with one another. Specifically, the qualitative data suggested that students lacked self-efficacy for developing relatedness across attendance modes.

As noted above, the results from Year 1 and Year 2 firmly established that there are notable deficiencies regarding relatedness development in synchronous hybrid programs. In particular, the findings showed that synchronous hybrid students have difficulty making connections across attendance modes (i.e., online and on-campus students find it challenging to form relationships with one another). Accordingly, the present study, Year 3 of this ongoing investigation, aimed to develop a tool to address the relatedness deficiencies identified in Year 1 and Year 2 (See figure 1).

Acknowledgment of External Grant Funding

Prior to the beginning of Year 2, an external grant was obtained through the Learning Environments Across Disciplines (LEADS) research partnership to continue investigating the factors associated with student achievement in synchronous hybrid learning environments. The LEADS partnership is funded by the Canadian Social Sciences and Humanities Research Council (SSHRC). The directive of LEADS (2014) is to investigate the factors that will help improve student learning and retention in TREs.

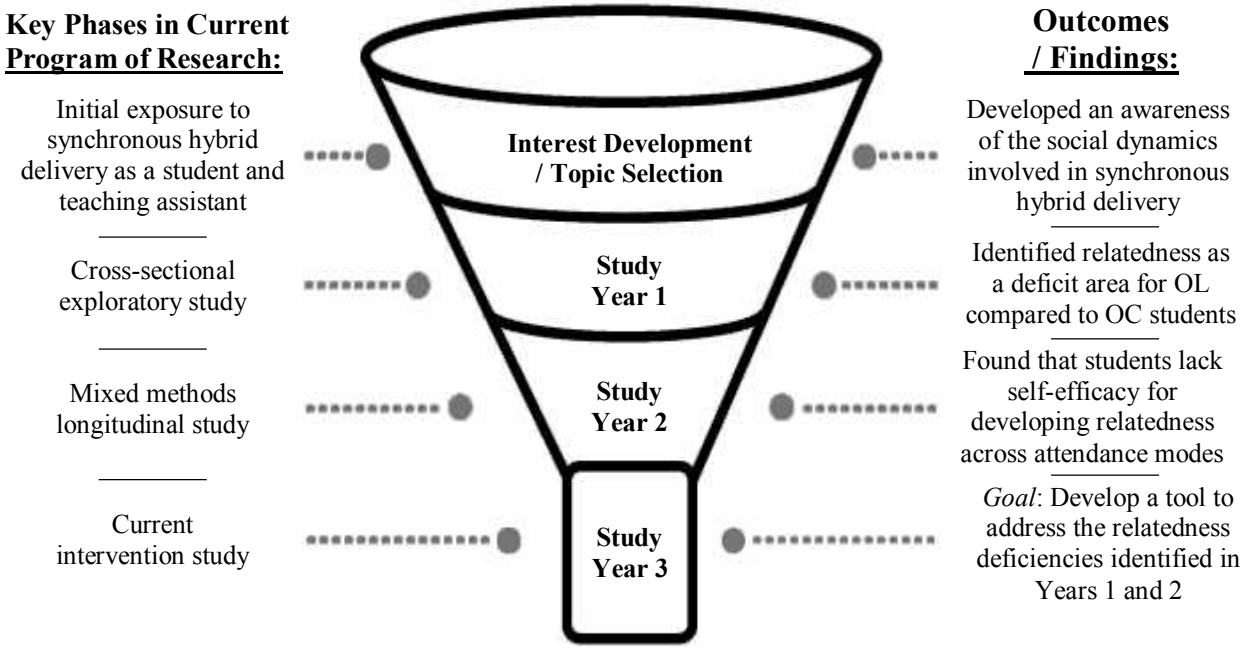


Figure 1. Evolution of the Program of Research Leading to the Current Intervention Study. OL = Online, OC = On-campus.

In total, the LEADS partnership has awarded this project approximately $25,614 in U.S. currency over a two-year period spanning from March 2013 to March 2015. The substantial financial support received through LEADS is noteworthy for two reasons. First, it reflects the increasing attention being paid to studies of student achievement in TREs. Second, it underscores the importance of the questions raised by this program of research. The funding awarded through LEADS covered the costs associated with participant incentives, equipment, and travel for the mixed methods study in Year 2 as well as the intervention study in Year 3.

Study Context

This study made a unique contribution in that it demonstrated the utility of contextual support in synchronous hybrid learning environments. In the current study, synchronous hybrid delivery was defined as a single virtual space used to provide simultaneous instruction to both on-campus and online students using real-time audio and video technology (Roseth, Akcaoglu, & Zellner, 2013). In particular, this study examined synchronous hybrid programs taught using the Adobe Connect™ interface (see Figure 2).

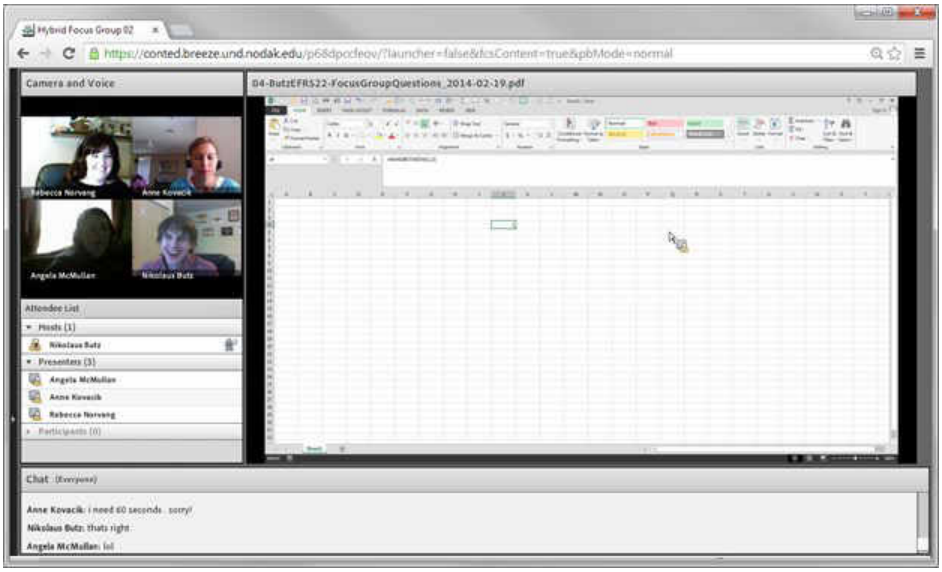


Figure 2. Screen Capture of the Adobe Connect™ Interface.

The intervention presented in this study was designed to promote or scaffold student relatedness and self-efficacy for relatedness development by providing opportunities for peer interaction using an online discussion board. The research methods involved a pretest-posttest experimental design in which students were randomly assigned to either the experimental group, wherein they participated in an asynchronous online discussion board, or the control group, wherein they attended classes as normal without any auxiliary interactions (see Figure 3). This study used a convergent parallel mixed methods approach in which both quantitative and qualitative data were collected via a series of online surveys.

Participants were recruited from a sampling frame of students enrolled in the synchronous hybrid Masters of Business Administration (MBA), Masters of Public Administration (MPA), or Masters of Aviation (MS-Avit) programs offered at a large U.S. research university. At the time of the study, combined enrollment in these programs was 290 students (MBA = 127, MPA = 116, MS-Avit = 47). In total, 83 participants were recruited from the sampling frame using the email listservs maintained by each program.

This study examined seven research questions, six quantitative and one qualitative. The quantitative research questions were addressed using survey data collected from the pre- and posttests. The qualitative research question was addressed using thematic analysis of students' responses to open-ended items on the manipulation check that followed the intervention. The analysis procedures were guided by separate paradigmatic traditions (Onwuegbuzie, Slate, Leech, & Collins, 2007). As such, the quantitative and qualitative data were analyzed separately before being merged into an overall interpretation. The research questions are presented in detail later in this chapter.

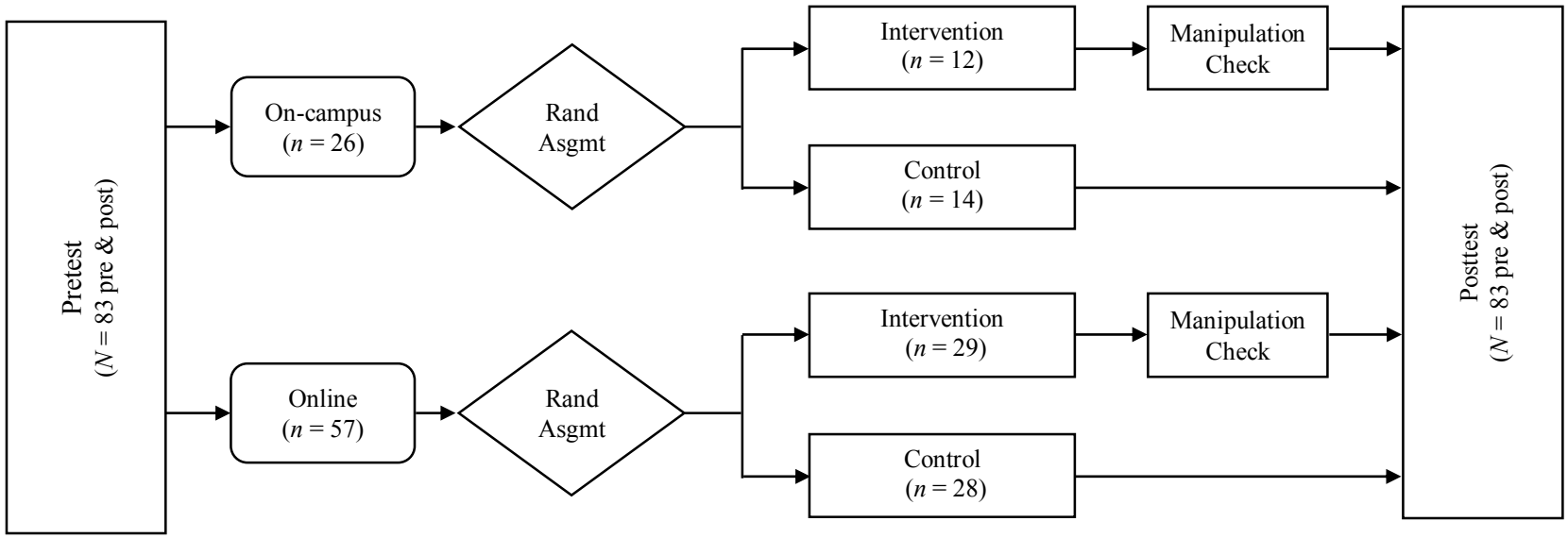


Figure 3. Pretest-Posttest Experimental Design.

This study was the researcher's third investigation in a program of research examining the antecedents of success in synchronous hybrid learning environments. The key variables in this study were students' perceptions of relatedness and self-efficacy for relatedness development (SERD). Other distal variables included autonomy, competence, motivation, extraversion, and perceived success. Ryan and Deci's (2000) self-determination theory (SDT) was adopted as the theoretical framework for this study as it explicitly addresses the role of relatedness in achievement settings.

Theoretical Framework

SDT is a humanistic approach to motivation that explicates the dynamics of need satisfaction, motivation, and well-being (Ryan & Deci, 2000). To date, SDT has been successfully applied in many areas, including work climate (Deci et al., 2001), health care (Williams & Deci, 1996), politics (Losier, Perreault, Koestner, & Vallerand, 2001), and religion (Neyrinck, Lens, & Vansteenkiste, 2005). In the context of educational research, Ryan and Deci (2002) postulated that optimal motivation, and in turn academic success, occurs when students are given opportunities to satisfy their basic psychological needs for autonomy (being the perceived origin of one's own behavior), competence (feeling effective and capable), and relatedness (feeling connected to others). From the lens of SDT, greater levels of perceived satisfaction in terms of the basic psychological needs enhances motivation and well-being, whereas reduced need satisfaction can undermine individuals' motivation and well-being.

According to Ryan and Deci (2000), three main types of motivation mediate the relationship between need satisfaction and well-being: intrinsic motivation (behavior for the inherent satisfaction found in the task), extrinsic motivation (behavior in relation to a

separable outcome), and amotivation (choosing not to perform a behavior or doing so without intent). Ranging from externally- to internally-focused regulation, Ryan and Deci (2000) further divided extrinsic motivation into four categories: external (performing a behavior to obtain a reward or avoid a punishment), introjected (performing a behavior to avoid internally-imposed feelings of guilt or anxiety), identified (performing a behavior that has been aligned with personal goals), and integrated (performing a behavior that has been fully assimilated with internal needs and values).

To date, the primary focus of SDT research in education has been on autonomy or competence support, with little attention paid to the effects of relatedness support (Ryan, Stiller, & Lynch, 1994). Nevertheless, previous research has indicated that positive feelings of relatedness correlate strongly with intrinsic motivation and academic success (Furrer & Skinner, 2003; Giesbers, Rienties, Tempelaar, & Gijselaers, 2013a). The question emerges, what can be done to promote relatedness and self-efficacy for relatedness development in synchronous hybrid learning environments?

Purpose of the Study

The purpose of this study was to examine the effects of an asynchronous online discussion intervention on students' perceptions of relatedness and self-efficacy for relatedness development in synchronous hybrid learning environments. In particular, this study extended the scope of previous research on TREs by implementing a targeted intervention that sought to improve the shortcomings of synchronous hybrid learning environments by scaffolding student relatedness with an asynchronous online discussion activity. Using the SDT framework, this study also examined students' autonomy, competence, motivation, and perceived success.

Research Questions

This study used quantitative survey data to explore the effects of incorporating an asynchronous online discussion intervention into existing synchronous hybrid programs. This study also used quantitative techniques to test the tenability of Ryan and Deci's (2000) SDT framework in this emerging delivery mode. In addition, a constant comparative approach was used to synthesize the qualitative statements students made regarding their experiences in the asynchronous online discussion intervention. To these ends, a convergent parallel mixed methods design was adopted with the purpose of producing triangulated results based on the multiple data sources used in this study (QUAN + qual = triangulation; Creswell & Plano Clark, 2011). Mixing of the data types was limited to the final interpretation of the findings. Overall, seven research questions, six quantitative and one qualitative, were addressed by this study:

1. Do the bivariate linear relationships posited by SDT manifest within the synchronous hybrid learning environment?
2. Do online and on-campus students have different pretest scores on any of the study variables?
3. Do online and on-campus students have different posttest scores on any of the study variables?
4. Do relatedness and SERD scores differ between the pretest and the manipulation check for students in the experimental group?
5. Do relatedness and SERD scores differ between the pretest and the posttest for students in the experimental group?

6. Do relatedness and SERD scores differ between the pretest and the posttest for students in the control group?
7. What themes emerge regarding the qualitative statements made by students who participated in the asynchronous online discussion intervention?

Importance of the Study

This study is important in that it provided empirical evidence that an asynchronous online discussion intervention can be successful in fostering self-efficacy for developing relatedness with online students in synchronous hybrid programs. Perceptions of relational deficiencies have been identified as an area of concern for synchronous hybrid learning environments (Butz et al., 2014), and the development of a new tool for building relationships in this emerging delivery mode makes a welcome contribution to the field. Accordingly, the findings from this study may hold implications for students, SDT theorists, and educational practitioners, including instructional designers and faculty members.

This study also made an important contribution to the body of inquiry surrounding TREs. It has been postulated that learning in TREs is a more complex endeavor than learning in a traditional, brick and mortar classroom (Rienties, Tempelaar, Van den Bossche, Gijselaers, & Segers, 2009). To date, however, much of the research on TREs has primarily focused on asynchronous course delivery (Hrastinski & Keller, 2007). This study demonstrated that synchronous and asynchronous communication systems can be used in concert with one another to create a socially nurturing TRE.

The study further contributes to the field of motivational research in that it applied SDT in the underexplored area of synchronous hybrid program delivery. While many

studies have examined traditional classrooms and found stable relations between need satisfaction, motivation, and well-being (Guay, Ratelle, & Chanal, 2008), the tenability of SDT in synchronous hybrid learning environments has not been robustly explored (for an exception see Butz et al., 2014). Given that research on synchronous modalities has, for the most part, not been guided by SDT, the majority of studies in this area have neglected to examine student relatedness and its antecedents. To date, no studies of synchronous hybrid learning environments have attempted to manipulate student relatedness development using an intervention. This study addressed the current limitations in the literature by testing a relatedness development intervention based on the SDT framework. By investigating previously observed deficiencies in student relatedness, this study marks an important step in improving teaching and learning in synchronous hybrid programs.

Delimitations

The scope of the current study was defined by a number of delimitating factors. First, the decisions made regarding recruitment and data collection served to establish the boundaries of the study. In terms of inclusion, both full-time and part-time students were eligible to participate in this study; however, the sample was restricted to graduate students who were currently enrolled in either the synchronous hybrid MBA, MPA, or MS-Avit programs offered at a single large U.S. research university. This strict limitation on the sampling frame was imposed to ensure alignment with the data collected during pilot testing. Students were recruited for this study using the email listservs maintained by the program directors. The recruitment email contained a hyperlink to an online survey hosted through Qualtrics™, a web-based data collection tool. Accordingly, only

students who receive listserv emails and have access to a web browser were included in this study.

Second, decisions involving the study focus also served to define the boundaries of this investigation. This study examined the effects of an asynchronous online discussion interventions on student relatedness and self-efficacy for relatedness development in synchronous hybrid programs. Other forms and applications of TREs were not considered. Decisions regarding the selection of independent and dependent variables, including the primary focus on relatedness, were made based upon previous research conducted by the principal investigator. As such, the researcher acknowledges that this study did not provide an exhaustive investigation of all the factors that affect student performance in synchronous hybrid programs.

Lastly, decisions regarding instrumentation and theoretical framework determined the scope to which practitioners and scholars can compare the presented results with other investigations of synchronous hybrid learning environments. In terms of instrumentation, the quantitative data for this study were collected using multi-item scales, and therefore, components of the constructs not reflected by the chosen measures were not considered. In terms of a theoretical foundation, this study used Ryan and Deci's (2000) SDT to guide the analyses and interpret the results. Accordingly, even though other relationships may exist among the study variables, this study focused on the relationships posited by SDT.

Limitations

In addition to the delimitations discussed above, the results of this investigation must also be interpreted in light of the study's limitations. In terms of the study

participants, the results of this investigation may be specific to the sample. That is, this study only examined graduate students within the disciplines of business, public administration, and aviation. All of the participants in this study were master's degree seeking students, and therefore, they may have certain attributes that affected the way they approached or experience the synchronous hybrid learning environment or the asynchronous online discussion intervention. Likewise, the results of this study may have limited generalizability for other institutions that have larger class sizes with a different composition of online and on-campus students. It should be further noted that while participants were randomly assigned to either the experimental or control groups, students self-selected into the online or on-campus groups.

The full magnitude of the results of this study may also be restricted by the limited time frame over which data were collected—both the pretest and posttest were administered in one 16-week semester. Accordingly, it is not possible to determine whether or not the effects of the intervention are sustainable over a longer period of time. Likewise, with the exception of GPA scores, the results of this study were based on self-report data, rather than objective measures.

Finally, the data for this study were collected from three synchronous hybrid programs, each with a diverse body of faculty members. Logically, instructors will vary in terms of their attitudes and teaching styles, as well as their level of proficiency with the course delivery system. Therefore, it is probable that these variations could have influenced students' experiences in their synchronous hybrid program.

Assumptions

1. Synchronous hybrid delivery will continue to gain momentum and acceptance in higher education.
2. Participants responded honestly and completely to the survey items, and students in the experimental group put forth full effort during the intervention.
3. Participants' level of previous experience with synchronous hybrid delivery systems did not impact the effectiveness of the intervention.
4. All synchronous hybrid students can benefit from greater feelings of relatedness, regardless if individual learners place a high value on interactions with other students.
5. The researcher was able to use the quantitative data collected to deductively test the observed relationships from a postpositivistic perspective involving a single, objective reality (Creswell, 2014).
6. The qualitative data accurately reflect the lived experiences of synchronous hybrid students as described by the participants (Husserl, 1962).

Definitions

- *Motivation*: "the psychological processes involved in the direction, vigor, and persistence of behavior" (Bergin, Ford, & Hess, 1993, p. 437). Motivation can be further classified by Ryan and Deci's (2000) SDT framework as intrinsic motivation (behavior for the inherent satisfaction found in the task), extrinsic motivation (behavior in relation to a separable outcome), and amotivation (choosing not to perform a behavior or doing so without intent).

- *Perceived success*: satisfaction with one's academic performance (Hall, Hladkyj, Perry, & Ruthig, 2004).
- *Relatedness*: the basic psychological need for relationships experienced through interaction or attachment with individuals or a social community, feeling connected to others, or maintaining a sense of belonging or affiliation (Ryan & Deci, 2000). Relatedness has a broad meaning that encompasses the interpersonal experiences mentioned above, and therefore, these terms are used interchangeably throughout the chapters of this dissertation.
- *Self-determination theory (SDT)*: a humanistic approach to motivation that explicates the dynamics of need satisfaction, motivation, and well-being (Ryan & Deci, 2000).
- *Self-efficacy for relatedness development (SERD)*: a student's belief that he or she is able to develop relatedness with peers in the learning environment.
- *Technology-Rich Learning Environments (TREs)*: "any learning environment that is designed for an instructional purpose and uses technology to support the learner in achieving the goals of instruction" (Lajoie & Azevedo, 2006, p. 803).
    - *Asynchronous*: a learning environment with pedagogical freedom from space and time (Chow, 2013).
    - *Synchronous*: a learning environment with "two or more people in the same real or virtual space at the same time" (Chow, 2013, p. 127).

Summary

The rapid innovation of asynchronous and synchronous course delivery options has introduced new possibilities and challenges for teaching and learning in TREs. Asynchronous platforms provide a common medium for all students to interact with one another, yet these systems lack opportunities for spontaneous discourse. In contrast, synchronous formats offer real-time communication, but online and on-campus students often find it difficult to develop relatedness with peers who attend class using the opposite delivery mode. Therefore, despite the evolution of asynchronous and synchronous modalities, feelings of isolation remain a major issue (i.e., lack of relatedness). Previous research suggests that students would benefit from an intervention that incorporates elements of both synchronous and asynchronous communication, wherein the strengths of one delivery mode would offset the weaknesses of the other. The purpose of this study was to examine the effects of an asynchronous online discussion intervention on students' perceptions of relatedness and self-efficacy for relatedness development in synchronous hybrid learning environments.

This chapter provided an introduction to the research problem along with a brief description of the evolution of the current program of research. The central tenets of SDT were discussed in terms of the theory's application as the theoretical framework for this research. A concise study purpose statement was advanced to explain the intent of this investigation. Research questions were identified followed by a discussion of the importance of this study. Delimitations, limitations, and assumptions were also presented. The chapter concluded with a list of definitions relevant to this study. A comprehensive review of the literature that informed this study is presented in the next chapter.

CHAPTER II

LITERATURE REVIEW

The purpose of this study was to examine the effects of an asynchronous online discussion intervention on students' perceptions of relatedness and self-efficacy for relatedness development in synchronous hybrid learning environments. Ryan and Deci's (2000) self-determination theory (SDT) was adopted as the theoretical framework for this study as it explicitly addresses the role of relatedness in achievement settings. Other distal variables included autonomy, competence, motivation, extraversion, and perceived success. Students' membership in either the experimental or control group as well as their attendance mode in the synchronous hybrid learning environment (online vs. on-campus) was also considered. A convergent parallel mixed methods approach was utilized to collect the necessary data. This literature review synthesized the existing academic work that informed this study. Accordingly, this chapter covers the following four main sections:

1. *Technology-Rich Learning Environments (TREs)*, which describes educational technology for distance education in general, then focuses in particular on blended, asynchronous, and synchronous course delivery systems;
2. *Self-Determination Theory (SDT)*, which provides an overview of the theory, including the basic psychological needs (autonomy, competence, and relatedness) and the associated types of motivation, as well as a discussion of the theory's application in traditional educational settings and TREs;

3. *Relatedness and Motivation*, which presents a methodological analysis of previous qualitative, quantitative, and mixed methods research on relatedness and motivation in synchronous hybrid learning environments; and
4. *Student Relationships and Networking Interventions*, which offers commentary on student relationships and introduces online networking interventions for promoting relatedness in TREs.

This review of the literature was designed to not only demonstrate the need for this research, but also provide the important background information and definitions necessary to frame the rationales, methods, and conclusions of this study. As such, each section in this literature review is intended to be interpreted in relation to the larger study design. Figure 4 was developed by the principal investigator to illustrate the connections between the various bodies of literature that inform this study. Collectively, this chapter aims to bridge the literature in these areas, thereby contextualizing the approach used in the current investigation.

Technology-Rich Learning Environments

The challenge of disseminating information from a local teacher to a distant student has existed in education for many years. The first established distance learning programs were correspondence courses, which began in Germany in the 1840s and spread to the U.S. in the 1880s (Abbot, Kreszock, Ochoa, & Purpur, 2013). The next generation of course delivery included radio broadcasts in the 1920s, followed by one-way television transmission in the 1930s (Simonson, Smaldino, Albright, & Zvacek, 2009). By the late 1950s, instructional television (ITV) programs had evolved to offer a

two-way, live audio and video format (Saba, 2000). However, Casey (2008) observed that "the computer was the missing piece of the [distance] education puzzle that would facilitate the free flow of information between teacher and learner" (p. 47). Today, the Internet has become the primary vehicle for delivering information to remote students (Abbot et al., 2013).

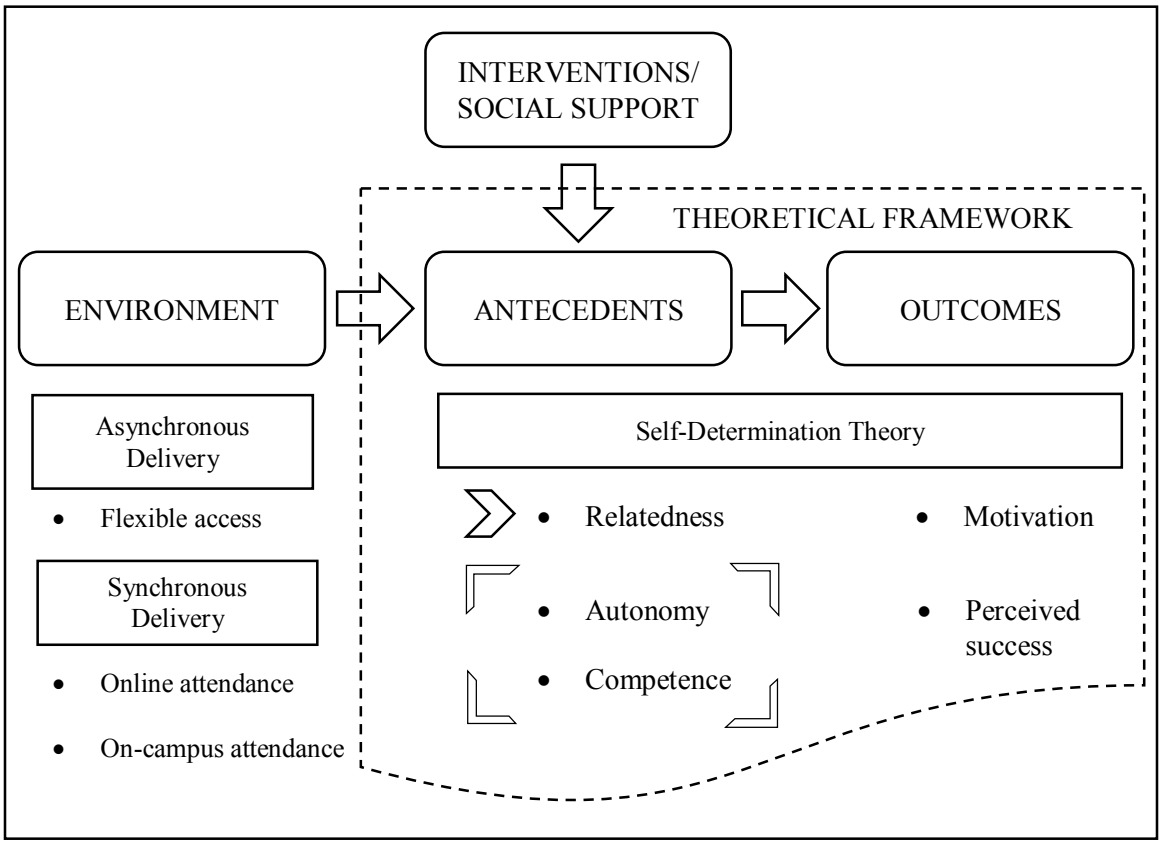


Figure 4. Conceptual Relationships Among the Relevant Bodies of Literature.

The first decade of the 21st century saw a dramatic increase in the number of Internet-based course offerings. According to the Sloan Consortium annual survey (Allen & Seaman, 2014), over 94% of U.S. postsecondary institutions with enrollments of 1,500 or more offered technology-rich delivery options in 2013. Lajoie and Azevedo (2006) defined technology-rich learning environments (TREs) as any "learning environment that

is designed for an instructional purpose and uses technology to support the learner in achieving the goals of instruction" (p. 803). Taking a broad perspective, academic discourse on TREs has examined how communication patterns, forms, functions, and conventions have allowed people to derive meaning from such instructional environments (Naidu & Järvelä, 2006).

The literature on TREs is growing exponentially in all directions. The annual *Horizon Report* has offered commentary on an ever-increasing array of pedagogical technologies since 2002 (New Media Consortium, 2014). Given this impressive tenure of expansion, the study of educational technology is often complicated by the staggering array of terms that have emerged in the extant literature on TREs. For example, the adjectives *online*, *virtual*, *distributed*, *remote*, and *hybrid* have all been used to define nontraditional course delivery modes that use technology to facilitate teaching and learning. Figure 5 was developed by the principal investigator to schematize the TREs that are most commonly used in higher education. This typology categorizes the available delivery modes in terms of the temporal quality of the pedagogical interactions (asynchronous, synchronous, or blended) and the location of the learners (entirely online, entirely on-campus, or hybrid enrollment). Given that most TREs can be modified to accommodate a mix of learners from various locations, the following discussion uses the temporal interaction trichotomy to describe the available course delivery modes.

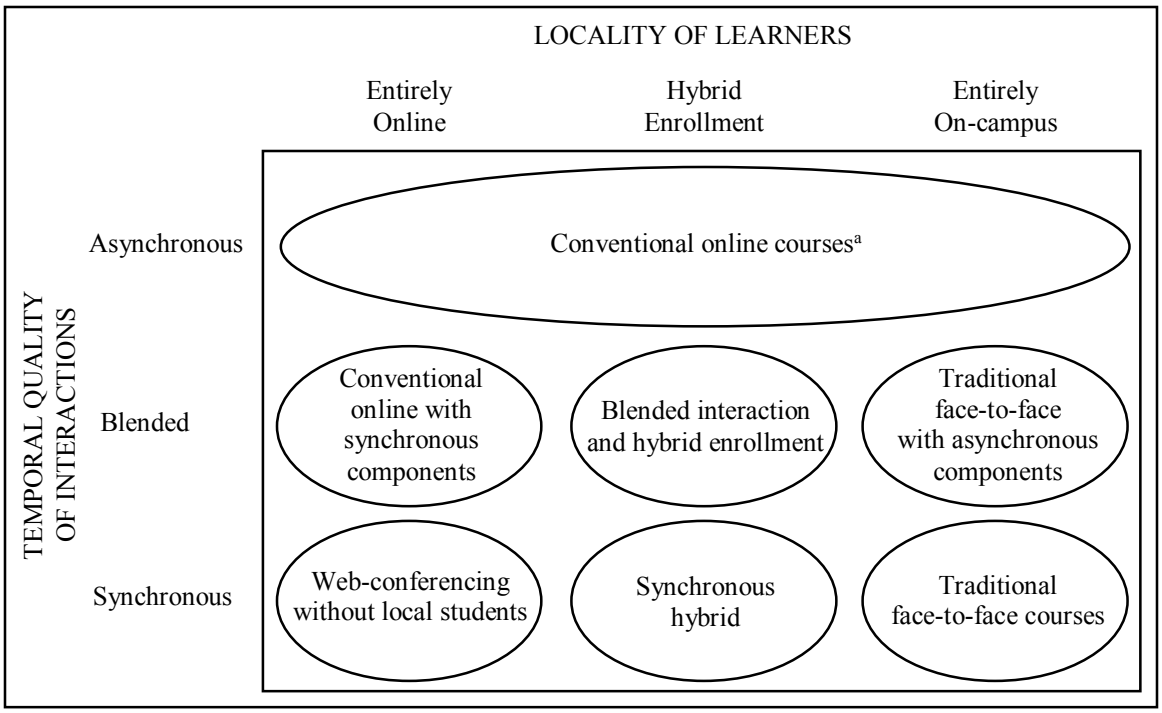


Figure 5. Typology of TREs by Interaction Type and Learner Location.
[a] It is not necessary to differentiate conventional online courses in terms of location of the learner because a student who physically resides on-campus, but chooses to enroll in an asynchronous online course, will presumably have the same experience as any other student enrolled in the course.

Blended Delivery

Blended delivery refers to instructional approaches that combine both asynchronous and synchronous components (for a review of blended learning see Hughes, 2007; Vignare, 2007). However, it should be noted that, by definition, these components cannot occur simultaneously. That is, if the instructor requires students to attend class physically on-campus (synchronous) as well as participate in an online discussion board (asynchronous), these activities do not occur simultaneously, and therefore represent different categories of interaction. The graduate programs investigated in this study were originally designed to only provide synchronous interaction among the online and on-campus students enrolled; however, this research examined the effects of extending this format to include asynchronous interaction. At present, very little has been

published on the purposeful mixing of interaction types in TREs (for an exception see Irvine, Code, & Richards, 2013). Therefore, in order to provide the necessary background information on learner interaction in TREs, the following discussion will use the dichotomy between asynchronous and synchronous interaction as a lens for analysis.

Asynchronous Delivery

Asynchronous online delivery models first appeared in the U.S. in the early 1980s (Harasim, 2000), and to date, much of the research on TREs has focused on asynchronous course delivery (Hrastinski & Keller, 2007). According to Chow (2013), asynchronous course delivery can best be conceptualized in terms of pedagogical freedom from space and time—that is, neither variable has to be present for asynchronous learning to occur. Early adopters defined asynchronous delivery platforms as "learning at anytime or in anyplace using the Internet and World Wide Web software tools (e-mail, electronic bulletin boards, and Webpages) as the main vehicles for instruction" (Picciano, 1998, p. 2).

To this day, it is that anytime, anyplace flexibility that remains the defining characteristic of asynchronous delivery. Hrastinski (2008a) noted that asynchronous delivery makes it possible for learners to download content, refine their contributions, or send messages to teachers or peers when participants cannot be online at the same time. In fact, attending courses asynchronously is the only option for students who are place-bound or bound by demanding personal or professional schedules.

Even though asynchronous courses offer added convenience and flexibility, communicating in these time-delayed systems can be difficult (Liu, Magjuka, Bonk, & Seung-hee, 2007). Specifically, communication in asynchronous programs sufferers from

not only a lack of opportunities for students to interact in synchronistic ways (West & Jones, 2007), but also there is the potential for written contributions to be misinterpreted due to the absence of a shared physical or temporal context (Fischer & Ostwald, 2005). Vrasidas and Zembylas (2003) also found that the lack of body language, facial expressions, and gestures can induce feeling of isolation (i.e., low level of relatedness with peers). In short, asynchronous delivery takes away many of the common elements that traditional classrooms offer, leaving asynchronous students to initiate their learning in what many find to be a more solitary and less motivating environment.

Synchronous Delivery

In response to the shortcomings of asynchronous education, an increasing number of postsecondary institutions are beginning to offer synchronous delivery as a course option (Bower, 2011). Drawing again on the seminal variables of space and time, Chow (2013) defined synchronous delivery as "two or more people in the same real or virtual space at the same time" (p. 127). Two-way, real-time delivery systems have existed since the early ITV networks of the 1950s (Saba, 2000); however, more recently, web-conferencing platforms have emerged as the de facto approach to synchronous course delivery (Bower, 2011).

At present, the most commonly used synchronous web-conferencing platforms include Adobe Connect™ (formerly Macromedia Breeze; Adobe Systems Inc., 2014), Blackboard Collaborate™ (formerly Wimba Classroom and Elluminate Live!; Blackboard Inc., 2014), and WebEx Collaboration Suite (Cisco Systems Inc., 2014). Despite the wide array of vendors offering synchronous delivery solutions, Bower and Hedberg (2010) noted that each platform offers similar features:

- Presentation delivery – PowerPoint presentations or general documents
- Screen-sharing – entire desktop or single window
- Webcam – ability to stream a live video feed
- Text-chat – capacity to send to all or selected individuals
- Whiteboard – various color and font options as well as document overlay
- File upload/download – selected from computer or content library
- Polling – allowing questions to be displayed and participants to vote
- Attendee list – including status indicator and raised hand icon
- Notepad – to communicate instructions or enable collaborative authoring (p. 465)

This study examined a mixed group of online and on-campus students enrolled in graduate programs that utilized the Adobe Connect™ system.

Similar to the many platforms available, a number of terms have emerged from the literature that describe the simultaneous teaching of online and on-campus students. Some of these terms, such as Bower et al.'s (2012) "blended synchronous learning" and Bell, Cain, and Sawaya's (2013) "synchromodal learning," emphasize the distinctive real-time attribute of this delivery mode; whereas other terms, such as Irvine et al.'s (2013) "multi-access learning," underscore improved flexibility. In this study, the term *synchronous hybrid delivery* was used to describe a course delivery option that provides synchronous instruction to mutually exclusive groups of online and on-campus students in a single learning environment (Roseth et al., 2013).

It is often broad educational goals that steer how postsecondary programs invest in and use technology (Humphreys, 2012). Synchronous hybrid delivery has the benefit

of preparing students for careers in our technology-driven society. According to a study published by the Association of American Colleges and Universities (2007), employers want postsecondary institutions to place more emphasis on training students how to communicate and work effectively in synchronous hybrid environments. The New Media Consortium's (2014) *Horizon Report* also noted that the online/on-campus collaboration skills students develop in synchronous hybrid learning environments can be leveraged across all sectors of the economy.

Despite the growing popularity of synchronous hybrid programs (Bower, 2011), this emerging delivery mode is not without drawbacks. By definition, synchronous hybrid delivery involves combining mutually exclusive groups of online and on-campus students into a single learning environment. Integrating these groups can be a challenge as online and on-campus students generally perceive the instructional environment very differently (Mullen & Tallent-Runnels, 2006). Glazer and Wanstreet (2011) noted that despite instructors' attempts to create a single, unified learning environment, online and on-campus synchronous hybrid students are still susceptible to feelings of social isolation (i.e., feeling low level of relatedness with peers). To this end, synchronous hybrid students often perceive their interactions as being limited by the incompatibility of their divergent attendance modes. This suggests that more research needs to be done on synchronous hybrid programs that provide a separate interaction space that minimizes student differences based on course delivery mode. Accordingly, this study examined whether or not synchronous hybrid students were able to improve their perceptions of relatedness and self-efficacy for relatedness development by participating in an asynchronous online discussion intervention.

Although, the evolution of TREs has liberated education from the constraints of space and time (Chow, 2013), feelings of isolation remain a major issue (Glazer & Wanstreet, 2011). For example, although synchronous hybrid systems offer features that mimic face-to-face delivery (e.g., real-team, spontaneous communication; Irvine et al., 2013), discord has been found to exist between online and on-campus students concerning perceived relatedness (Butz et al., 2014), emotional activation (Butz, Stupnisky, & Pekrun, 2015), and assessment performance (Butz & Askim-Lovseth, 2014). The overarching concern is that when students feel isolated, they become disengaged, leading to a decline in motivation and academic success (Rovai, Ponton, Wighting, & Baker, 2007).

Beyond the apparent disconnect with certain tangible features of traditional, face-to-face delivery, little is known about how specific psychological elements affect the antecedents of success in synchronous hybrid learning environments. Ryan and Deci's (2000) self-determination theory was adopted as the theoretical framework for this study as it explicitly addresses psychological needs, such as relatedness, within the context of achievement settings. The following commentary provides an overview of the theory, as well as a discussion of the theory's application in traditional educational settings and TREs.

Self-Determination Theory

Ryan and Deci's (2000) self-determination theory (SDT) is one of the most empirically supported motivation theories available today. Over the past several decades, SDT has been successfully applied in many areas, including work climate (Deci et al., 2001), health care (Williams & Deci, 1996), politics (Losier et al., 2001), and religion

(Neyrinck et al., 2005). In addition, Guay et al. (2008) noted that SDT has guided more than 200 empirical education studies since its inception in 1985 (see Deci & Ryan, 1985). This section presents the core tenets of SDT, followed by a discussion of the theory's application in traditional educational settings as well as TREs.

Overview of Self-Determination Theory

SDT is a humanistic approach to motivation that explicates the dynamics of need satisfaction, motivation, and well-being (Ryan & Deci, 2000). Deci and Ryan (1985) conceptually defined *self-determination* as "a quality of human functioning that involves the experience of choice . . . [which becomes] the determinants of one's actions" (p. 38). As such, Deci and Ryan (1994) noted that intentional behaviors vary in the extent to which they are self-determined (experienced as being freely chosen and emanating from one's self) versus controlled (experienced as being pressured or controlled by some external or interpersonal force). SDT begins with the assumption that humans strive to be self-agents, inherently seeking to integrate experiences to the self (Ryan & Deci, 2002). In order for an individual to become more self-determined in his or her actions, Ryan and Deci (2000) postulated that conditions within a social context must provide opportunities for the individual to satisfy three basic psychological needs.

1. **Autonomy**. As defined in SDT, autonomy refers to "being the perceived origin or source of one's own behavior" (Ryan & Deci, 2002, p. 8). That is, autonomy is the feeling that one is able to act in accordance with one's inner interests or desires (Ryan & Deci, 2000). When people experience autonomy, they perceive themselves to be responsible for their own behaviors, which promotes self-determined motivation.

2. **Competence**. Rather than referring to an individual's actual ability, SDT addresses perceived competence, that is, the condition of "feeling effective in one's ongoing interactions with the social environment and experiencing opportunities to exercise and express one's capacities" (Ryan & Deci, 2002, p. 7). People experience competence when they believe they have the capacity to complete a task or engage in an activity (Ryan & Deci, 2000). As such, perceived competence promotes self-determined motivation by encouraging individuals to seek new challenges by which to test their skills.
3. **Relatedness**. The final basic psychological need, relatedness, is the most important in terms of this study. Ryan and Deci (2002) described relatedness as "feeling connected to others," and the desire to be "cared for by those others" in return (p. 7). People experience relatedness through interaction or attachment with individuals or a social community (Ryan & Deci, 2000). The need for relatedness has not been widely addressed in previous empirical research, thereby underscoring the need for the current study. Relatedness promotes self-determined motivation by providing the support and secure attachment needed for growth, exploration, and action (Ryan & Deci, 2000).

According to Ryan and Deci (2000), *contextual support* can promote optimal motivation and well-being by providing opportunities for individuals to fulfill their basic needs. Conversely, a lack of contextual support undermines individuals' motivation and well-being. Guided by the degree of need satisfaction, SDT posits three main types of motivation as mediating processes between need satisfaction and well-being.

1. **Intrinsic motivation.** Regarded as the most self-determined form of motivation, intrinsic motivation refers to a state in which an individual performs a behavior for the inherent interest or satisfaction he or she finds in the task (Ryan & Deci, 2000). To this end, an activity may be pursued because it is deemed to be enjoyable, optimally challenging, or aesthetically pleasing (Ryan & Deci, 2002). Intrinsic motivation is consider to be the optimal motivation for a social context (Guay et al., 2008).
2. **Extrinsic motivation.** By definition, extrinsic motivation refers to a state in which an individual performs a behavior in order to obtain a separable outcome (Ryan & Deci, 2000). More specific, with extrinsic motivation, an individual may be moved to act by the possibility of an external incentive (external regulation), the presence of internally-imposed feelings of guilt (introjected regulation), the magnitude of personal importance placed on the task (identified regulation), or the inherent alignment of the task with personal values and needs (integrated regulation). These parenthetically referenced conditions represent separate regulatory styles, which are presented in detail below. In comparison with intrinsically motivated behaviors, which are more likely to be sustained in the long-term, extrinsically motivated behaviors tend to cease when the external motivator is no longer present (Ryan & Deci, 2000).
3. **Amotivation.** Ryan and Deci (2002) defined amotivation as "the state of lacking intention to act" (p. 17). In general, amotivation occurs when an individual does not feel competent, perceives a lack of contingency upon

action, or finds little or no value in the task (Ryan & Deci, 2002). When amotivated, an individual will either choose not to act at all or act without purpose or direction (Ryan & Deci, 2000).

Among these three types of motivation, self-regulated motivation is engaged through extrinsic motivation (Ryan & Deci, 2000). Although extrinsically motivated behaviors are at first initiated by external sources, self-regulated motivation can occur through the process of *internalization*. During internalization, an individual begins to recognize and internalize the value of the behavior. To this end, Ryan and Deci (2000) advanced a continuum of regulatory styles with each successive level representing an increasing degree of internalization.

1. **External regulation.** Regarded as the least self-determined type of extrinsic motivation, external regulation occurs when behaviors are performed to avoid an external punishment, meet an external demand, or obtain an external reward (Ryan & Deci, 2000). For example, a student who does an assignment to receive praise from the instructor or to avoid confrontation is externally regulated (Deci, Vallerand, Pelletier, & Ryan, 1991).
2. **Introjected regulation.** By definition, introjected regulation occurs when behaviors are performed to avoid internally-imposed feelings of guilt or anxiety (Ryan & Deci, 2000). That is, an individual introjects the task into internal "ought" or "should" motives (Pintrich & Schunk, 2002, p. 258). For example, a student who makes a point to attend class on time to avoid feeling like a bad person is regulated by introjects (Deci et al., 1991).

3. **Identified regulation.** Gradual internalization can lead to identified regulation, which occurs when behaviors are performed because the action is deemed congruent with the individual's goals (Ryan & Deci, 2000). In this type of extrinsic motivation, the individual recognizes the task as being personally important, but he or she is still motivated externally. For example, a student who willingly does extra work in order to complete a course or gain a degree that is important for success in his or her field is regulated by identification (Deci et al., 1991).
4. **Integrated regulation.** Regarded as the most self-determined type of extrinsic motivation, integrated regulation occurs when behaviors are performed because the actions involved in the activity have been fully assimilated to the individual's values and needs (Ryan & Deci, 2000). Pintrich and Schunk (2002) described integrated regulation as the process whereby a task is integrated into one's self-schema, and thus performance becomes important to the individual's sense of self. For example, a student governed by integrated regulation may deem him- or herself a good student, and in turn, that identity becomes integrated with relevant tasks associated with the student's sense of self (Deci et al., 1991).

In summary, SDT holds that in order for an individual to become a determinant of his or her actions, conditions within the associated social context must provide opportunities to satisfy three basic psychological needs: autonomy, competence, and relatedness. In this process, greater levels of perceived satisfaction in terms of the basic psychological needs enhances self-determined motivation, whereas reduced need

satisfaction diminishes self-determined motivation. Accordingly, three main types of motivation mediate the relationship between need satisfaction and well-being: intrinsic motivation, extrinsic motivation, and amotivation. Ranging from externally- to internally-focused regulation, SDT further divides extrinsic motivation into four regulatory styles: external, introjected, identified, and integrated. The complete SDT framework is presented in Figure 6. This framework has been successfully applied in many areas; however, the tenability of SDT in TREs has not been fully substantiated. The following sections discuss the theory's application in traditional educational settings and TREs.

Self-Determination Theory in Traditional Educational Settings

There are a wealth of empirical studies showing that Ryan and Deci's (2000) SDT successfully captures the dynamic dimensions of motivation in traditional educational settings. Prior SDT research in brick and mortar classrooms has indicated that supporting students' basic psychological needs (autonomy, competence, and relatedness) promotes intrinsic motivation. In turn, intrinsic motivation has been found to be related to a number of desirable academic outcomes, such as persistence, creativity, and perceived success (e.g., Filak & Sheldon, 2003). The commentary below highlights select citations that have demonstrated the relative salience of autonomy, competency, and relatedness in traditional educational settings.

Autonomy. To date, the primary focus of SDT research in education has been on autonomy support, with minimal attention on relatedness or competence support (for a meta-analysis of autonomy support interventions see Su & Reeve, 2011). Many studies in this domain of SDT have examined the effects of autonomy-supportive versus controlling environments on intrinsic motivation. In one such study, Katz and Assor (2007) showed

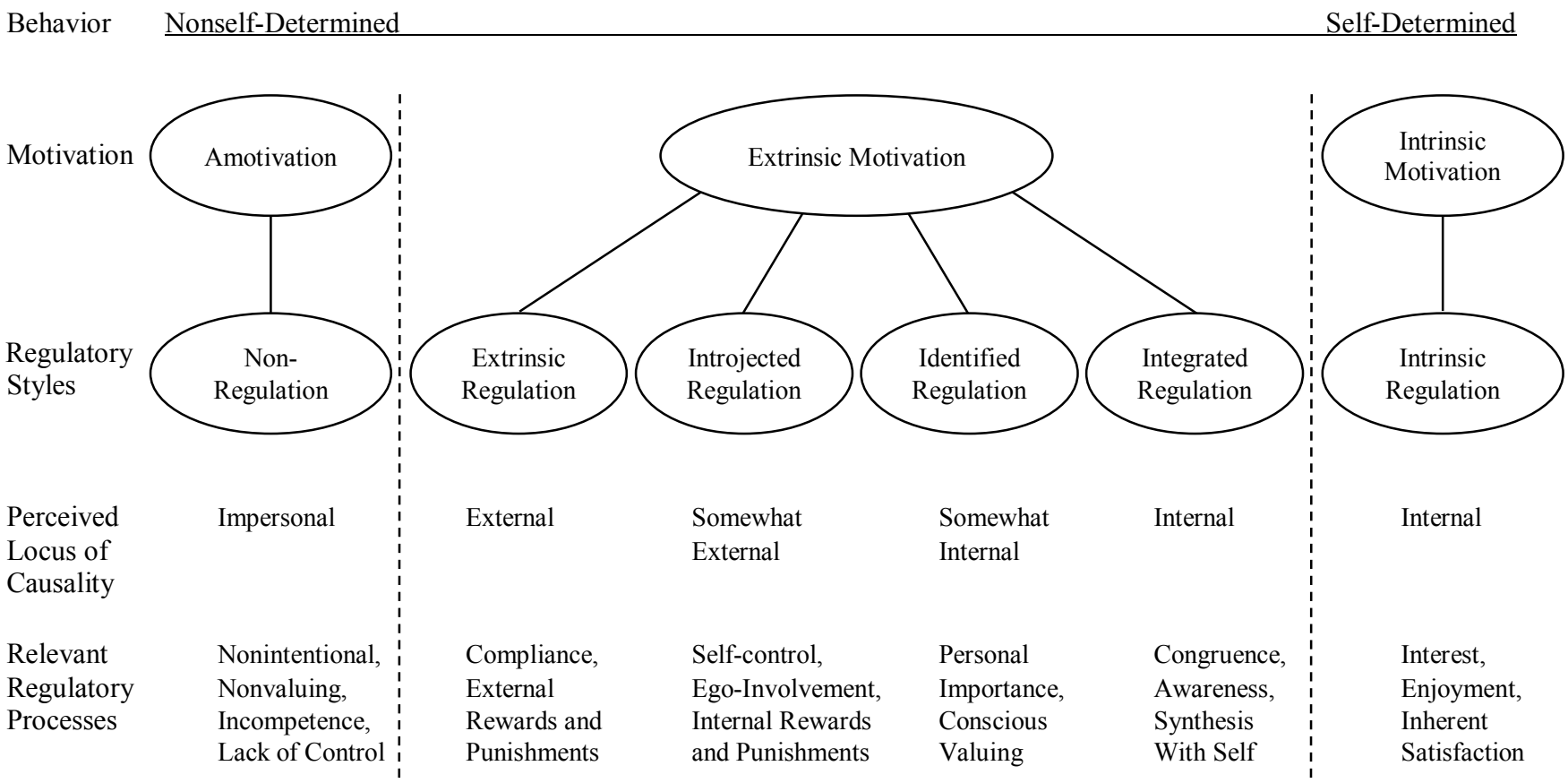


Figure 6. The Self-Determination Continuum. Adapted from "Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being," by R. M. Ryan and E. L. Deci, 2000, *American Psychologist*, *55*, p. 72. Copyright 2000 by the American Psychological Association.

the importance of "choicefulness" in supporting students' need for autonomy (p. 432). In two experiments with seventh-graders, they found that the option to select tasks that were consistent with one's individual interests fostered autonomy and intrinsic motivation. In addition to providing students with choices, Black and Deci (2000) found that undergraduate organic chemistry students reported an increase in perceived autonomy support when instructors limited the extent to which they used performance pressure or other academic demands to elicit behavior. In general, these and other studies have found that autonomy-supportive conditions promote intrinsic motivation.

Competence. Although autonomy support remains the most widely studied dimension of SDT-based need satisfaction research, a number of studies have examined the effects of competency support. Vallerand and Reid (1984) tested the effects of verbal feedback on perceived competence in undergraduate physical education courses. The results indicated that positive feedback increased perceived competence while negative feedback had a thwarting effect. Using path analysis, Vallerand and Reid also found that perceived competence mediated the relationship between teachers' feedback and students' intrinsic motivation. In another study, Vallerand, Fortier, and Guay (1997) used structural equation modeling to examine the influence of perceived competence on the academic persistence of high school students. Vallerand et al. (1997) obtained an appropriate model fit, thereby concluding that perceptions of competence led to higher levels of self-determined motivation, which negatively predicted student dropout.

Relatedness. While it is important to consider how previous research on autonomy and competence has substantiated the tenability of SDT in educational settings, the current study primarily focused on relatedness support. Compared to autonomy and

competency, however, the effects of relatedness support are rarely examined (Ryan et al., 1994). According to Ma (2009), the reason that the need for relatedness has not been widely assessed is due in part to the limitations of correlational research. That is, filling out questionnaires often leaves no opportunity for participants to interact with one another. One exception was a longitudinal study conducted by Furrer and Skinner (2003) that used teachers' observations of student-student interactions, in conjunction with students' self-reports, to examine the influence of relatedness in an educational setting. The results indicated that a higher sense of relatedness was significantly correlated with greater self-determined motivation and academic engagement.

Self-Determination Theory in TREs

Experimental and correlational studies in traditional educational settings have shown that promoting autonomy, competence, and relatedness, can lead to enhanced intrinsic motivation and positive educational outcomes; however, SDT research is barely found in the literature on TREs, epically in regard to relatedness support. The extent to which previous research on TREs has examined relatedness is limited to cross-sectional self-reports associated with the larger SDT framework. In one such study, Butz et al. (2014) found that online synchronous hybrid students experience significantly lower levels of relatedness than their on-campus counterparts. Another study conducted by Giesbers et al. (2013a) reported significant large positive correlations between relatedness and intrinsic motivation for college students who participated in synchronous online tutoring sessions. Using data collected from online courses offered by the United Nations Staff College, Roca and Gagné (2008) found that perceived relatedness positively predicted learners' intention to continue in their program. Chen and

Jang (2010) used SDT to guide a comparison of two online programs. This study offered evidence for a mediating effect of relatedness between student motivation and perceived success. Aside from these studies, however, SDT-based relatedness research in TREs is scarce.

The question emerges, what can be done to promote students' feelings of relatedness in synchronous hybrid learning environments? A number of researchers have suggested that both synchronous and asynchronous communication systems could be used in concert with one another to create a socially nurturing TRE that promotes student motivation (Brown, 2001; Hrastinski et al., 2010; Liu et al., 2007; Rienties et al., 2009; Shackelford & Maxwell, 2012). In particular, Rienties et al. (2009) found that posting on an asynchronous discussion board established a common context for later synchronous interaction. This approach, however, has not previously been tested. While the literature reported above informed this study from a content perspective, in regard to course delivery modes, and from a theoretical perspective, in terms of SDT, the methodological design of this investigation was guided by previous research on relatedness and motivation in TREs.

Relatedness and Motivation in TREs

The corpus of research on TREs in higher education is extremely diverse. Numerous variations in the extant literature can be found in terms of technological environment (synchronous vs. asynchronous) and study foci (motivation, student engagement, tool use, course satisfaction, etc.). In accordance with the current study, a thematic literature review was conducted based on the themes of relatedness and motivation. The importance of these themes emerged from the principal investigator's

earlier work in this area as well as the background reading on TREs and SDT. As previously noted, relatedness can be conceptualized in terms of students' affiliation or connectedness with their peers, including their need for belonging, social interaction, and sense of community. In general terms, motivation can be defined as "the psychological processes involved in the direction, vigor, and persistence of behavior" (Bergin et al., 1993, p. 437).

A systematic combination of relevant search terms was used to facilitate the thematic selection of literature (see Figure 7). The keywords used in each category, along with connecting Boolean operators, returned a collection of literature on TREs that focused on themes associated with relatedness or motivation. No studies older than 2007 were included to ensure that the TREs under consideration possessed functionality consistent with the programs examined in this study. Some of the selected studies addressed only one of the prespecified themes of relatedness or motivation, while others considered both. Many of the studies also addressed other constructs not directly related to the current study. Discussion of these variables was minimized in this analysis.

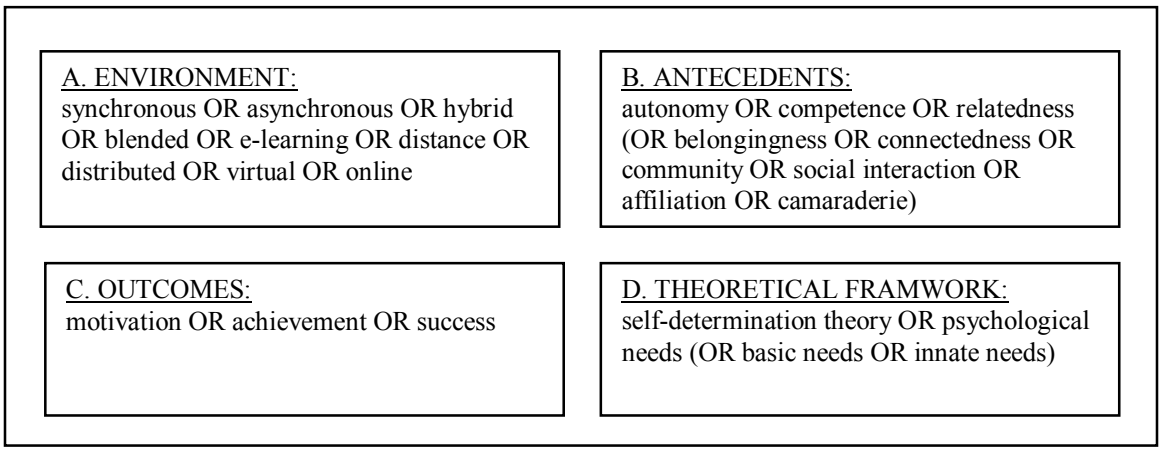


Figure 7. Categories of Search Terms Used for the Thematic Literature Review of Relatedness and Motivation in TREs.

Methodology for Thematic Literature Review of Relatedness and Motivation in TREs

The literature pertaining to relatedness and motivation in TREs was analyzed in terms of methodological approach (qualitative, quantitative, and mixed methods). Specifically, Boote and Beile's (2005) framework for a research methods-based literature review was used to guide the synthesis and analysis of the selected citations. First, the studies were analyzed within each methodology—qualitative, quantitative, and mixed methods. Second, the studies were examined as a whole in terms of the similarities and differences across methodologies. A summary of this analysis is presented in Table 1 (qualitative studies), Table 2 (quantitative studies), and Table 3 (mixed methods studies). The columns within these tables denote the various study design elements that were compared and contrasted. The studies under consideration are displayed in rows and presented in ascending order by publication date. This section ends by positioning the current study in context of the existing research, specially arguing for a targeted intervention designed to address relatedness in synchronous hybrid learning environments.

Qualitative studies on synchronous delivery. Four studies were examined that exclusively used qualitative methods to explore relatedness and motivation in TREs (Fasso, 2013; McBrien & Jones, 2009; Park & Bonk, 2007; Yamagata-Lynch, 2014). In terms of data collection, Yamagata-Lynch engaged in thematic analysis of reflection papers while the remaining three studies used open-ended questionnaires to gain insight into students' experiences in synchronous modalities. Park and Bonk also triangulated their findings with individual interviews and observations.

Table 1. Literature Search 2007–2014: Qualitative Studies on Student Interaction and Performance in Technology-Mediated Learning Environments.

Author(s)	Year	Methodology	Data Collection Techniques	Disciplinary Context	Participants	Tech. Environment / Software	Study Focus / Emergent Themes
Park & Bonk	2007	Qual	Open-ended survey questions, individual interviews, observations	Ed. Tech	Graduate (face-to-face & online) *N* = 8	Synchronous hybrid (text, audio) / Breeze™	Nature of interaction, sense of community, learning strategies
McBrien & Jones	2009	Qual	Open-ended survey questions	Special Ed., Psychology	Mixed graduate and undergraduate (face-to-face & online) *N* = 62	Synchronous hybrid (text, audio, video) / Elluminate Live!™	Dialogue, structure of course, learner autonomy
Fasso	2013	Qual	Open-ended survey questions	University First Year Experience	Faculty members *N* = 11	Synchronous hybrid (text, audio, video) / Blackboard Collaborate™	Technical issues, instructors' approach to social support, instructor workload
Yamagata-Lynch	2014	Qual	Self-study, observations, written student reflections of course activities	Ed. Tech	Graduate *N* = 8	Synchronous hybrid (text, audio, video), asynchronous online discussion / Blackboard Collaborate™	Sense of community, engagement, collaborative behaviors

Table 2. Literature Search 2007–2014: Quantitative Studies on Student Interaction and Performance in Technology-Mediated Learning Environments.

Author(s)	Year	Methodology	Data Collection Techniques	Disciplinary Context	Participants	Tech. Environment / Software	Study Focus / Emergent Themes
Wighting, Liu, & Rovai	2008	Quan	Online quan survey	Not specified	Mixed graduate and undergraduate *N* = 320	Face-to-face courses, asynchronous online courses / Blackboard™ (different students)	Motivation (intrinsic, extrinsic, amotivation), sense of community
Bower & Hedberg	2010	Quan	Quan multimodal discourse analysis	Information Technology	Graduate *N* = 26	synchronous hybrid (text, audio, video) / Adobe Connect™	Activity design, collaborative behaviors
Cotler, Kassab, & Yuan	2013	Quan	Online quan survey	Business	Undergraduate *N* = 16	Face-to-face session, synchronous hybrid session, (text, audio, video) / WebEx™ (same students)	Student engagement, participation, perceived stress
Giesbers, Rienties, Tempelaar, & Gijselaers	2013	Quan	Online quan survey, observation checklist, final exam grades	Economics	Undergraduate *N* = 110	Synchronous hybrid (text, audio, video) / Not specified	Motivation, participation, tool use

Table 3. Literature Search 2007–2014: Mixed Methods Studies on Student Interaction and Performance in Technology-Mediated Learning Environments.

Author(s)	Year	Methodology	Data Collection Techniques	Disciplinary Context	Participants	Tech. Environment / Software	Study Focus / Emergent Themes
Liu, Magjuka, Bonk, & Seung-hee	2007	*Mixed:* QUAN + QUAL	*Quan:* Online quan survey *Qual:* Individual interviews, dialogue from discussion boards	Business	*Quan:* Graduate $N = 102$ *Qual:* Graduate $N = 20$ Faculty members $N = 28$	Asynchronous online courses with synchronous chat (text) / Not specified	Sense of community, engagement, course satisfaction, perceived learning and quality
Hrastinski	2008	*Mixed:* QUAN → qual	*Quan:* Online quan survey, discussion boards post frequencies *Qual:* Individual interviews,	Knowledge Admin.	*Quan:* Graduate $N = 27$ *Qual:* Graduate $N = 12$	Asynchronous online discussions (text), synchronous online discussions (text) / Not specified	Participation, information exchange, task support, social support
Watson	2010	*Mixed:* QUAN(qual)	*Quan & Qual:* Online quan survey with open-ended survey questions	Business	*Quan & Qual:* Graduate $N = 75$	Asynchronous online courses / Not specified	Attitudes toward online interaction
Irvine, Code, & Richards	2013	*Mixed:* QUAN → qual	*Quan:* Online quan survey, *Qual:* Open-ended survey questions, individual interviews	Teacher Education	*Quan & Qual:* Undergraduate (face-to-face & online) $N = 16$	Synchronous hybrid (text, audio, video) / Not specified	Preferences for course access mode, importance of choice of access mode, perceived quality of learning
Vu & Fadde	2013	*Mixed:* QUAN → qual	*Quan:* Frequencies of observed behaviors *Qual:* Individual interview	Instructional Design	*Quan & Qual:* Graduate $N = 28$	Synchronous hybrid (text, audio) / Adobe Connect™	Preferences for course access mode, participation, information exchange, Student interactions

The study participants, and therefore, the lens through which the synchronous modalities were examined, varied slightly among the array of studies under consideration. Park and Bonk (2007) and Yamagata-Lynch (2014) captured the voices of students enrolled in graduate level educational technology courses. McBrien and Jones (2009) sampled a mix of graduate and undergraduate students from the fields of special education and psychology. Taking a different approach, Fasso (2013) generated data from 11 instructors who taught in a synchronous First Year Experience program at a regional university.

With regard to relatedness, the need for additional social support for synchronous hybrid students emerged as a common theme in all four studies. To this end, Park and Bonk (2007) suggested that regular meaningful interactions across the semester could enhance social presence and help build a sense of community. Yamagata-Lynch (2014) also found that working in small groups helped foster a sense of community. Similarly, both McBrien and Jones (2009) and Fasso (2013) identified social interaction as a key factor in synchronous hybrid learning environments.

With regard to motivation, Park and Bonk (2007) noted that both nonverbal and verbal communication influenced student motivation. Fasso (2013) suggested that student motivation could be supported through comprehensive instructor feedback. Yamagata-Lynch (2014) and McBrien and Jones (2009) did not address motivation.

Quantitative studies on synchronous delivery. In order to gain a balanced perspective, four exclusively quantitative studies were also selected for analysis (Bower & Hedberg, 2010; Cotler, Kassab, & Yuan, 2013; Giesbers, Rienties, Tempelaar, & Gijselaers, 2013b; Wighting, Liu, & Rovai, 2008). With the exception of Bower and

Hedberg, who used quantitative multimodal discourse analysis, all of the studies examined data collected using online quantitative surveys. However, there was little consistency in terms of measurement instruments and study variables. Both Giesbers et al. and Wighting et al. used Vallerand et al.'s (1992) the Academic Motivation Scale–College (AMS-C) to assess participants' motivation. In accordance with the widespread use of the AMS-C, this instrument was also adapted to measure participants' motivation in the current study. In addition to motivation, the quantitative studies under consideration also investigated a number of other notable variables associated with relatedness, including sense of community (Wighting et al.) and collaborative behavior (Bower & Hedberg).

With the exception of Wighting et al. (2008) and Bower and Hedberg (2010), all of the quantitative studies examined here sampled from bachelor's degree programs, suggesting more quantitative research may be needed at the graduate level. This void in the literature was filled by the current study. In terms of disciplinary context, two out of the four studies were conducted in business-related programs (Cotler et al., 2013; Giesbers et al., 2013b), one in an information technology course (Bower & Hedberg), and one did not qualify the TRE in terms of academic field (Wighting et al.).

In regard to relatedness, Bower and Hedberg (2010) noted that student-student collaborative activities yielded a more than six times larger rate of discourse than teacher-led instruction. Likewise, Cotler et al. (2013) reported that students were more likely to reach out to classmates than the teacher if they needed help. Wighting et al. (2008) differentiated between classroom and institutional peer communities with distinct

learning and social initiatives, finding that membership in each of these groups positively predicted academic success.

In terms of motivation, Wighting et al. (2008) observed that online students reported higher levels of intrinsic motivation than their on-campus counterparts. Expanding upon the role of motivation in TREs, Giesbers and his colleagues (2013b) reported that higher levels of intrinsic motivation significantly correlated with higher final exam scores in synchronous hybrid courses. Linking relatedness with motivation, Wighting et al. also found that the presence of a social community was positively correlated with intrinsic motivation.

Mixed methods studies on synchronous delivery. The final set of five studies adopted a mixed methods approach to investigating TREs (Hrastinski, 2008b; Irvine et al., 2013; Liu et al., 2007; Vu & Fadde, 2013; Watson, 2010). Morse's (1991) notation system was used to facilitate the discussion of mixed methods design features. Specifically, this notation system employs a plus sign (+) to denote methods that occurred simultaneously, an arrow (→) to designate methods that occurred in sequence, parentheses to indicate methods that were embedded within a larger framework, and uppercase/lowercase letters to show relative priority of the quantitative and qualitative methods, with uppercase signifying greater emphasis. Accordingly, the analysis presented below was particularly influential for developing the convergent parallel mixed methods approach used in the current study (QUAN + qual = triangulation; Creswell & Plano Clark, 2011).

Three of the five studies used an explanatory sequential design (QUAN → qual; Hrastinski, 2008b; Irvine et al., 2013; Vu & Fadde, 2013). Alternatively, Liu et al. (2007)

employed a convergent parallel design, QUAN + QUAL, and Watson (2010) adopted an embedded approach, QUAN(qual). The quantitative methods used in these studies were online surveys and frequencies of observed behaviors, while the qualitative components relied primarily on individual interviews to capture participants' voices.

For the most part, participants in the mixed methods studies were graduate students, with the exception of Irvine et al. (2013), who generated data from a sample of undergraduates. The results of these studies were also contextualized in terms of academic field. In particular, the relevant disciplinary contexts included technology (Hrastinski, 2008; Vu & Fadde, 2013), business (Watson, 2010), and teacher education (Irvine et al., 2013).

Similar to the exclusively quantitative studies reported above, there were considerable inconsistencies regarding the foci of the mixed methods analyses. For example, Liu et al. (2007) and Irvine et al. (2013) examined perceived quality of learning in TREs, while Hrastinski (2008b) took the lens of an instructional designer in his study of students' reactions to information exchange. There was also little overlap between Vu and Fadde's (2013) focus on student attendance and Watson's (2010) investigation of learner attitudes. However, despite this discord, themes emerged in all five studies regarding the importance of relatedness. Specifically, the findings of these studies suggested that interacting with others helps students to feel a sense of belongingness (Liu et al.), maintain closer connections with peers (Hrastinski; Irvine et al.; Vu & Fadde), and improve their learning experience (Watson).

With regard to motivation, Hrastinski (2008b) found that students who reported being able to work well with peers, also felt more motivated. Vu and Fadde (2013)

observed that a sense of isolation due to a lack of student-student interaction often resulted in low-motivation among learners. Lastly, Liu et al. (2007) suggested that students are more likely to be motivated to engage with peers when teachers model social roles.

Across-methodology analysis. The importance of relatedness was reported not only in the mixed methods studies, but also in the exclusively qualitative and quantitative investigations. Variables associated with relatedness, such as student interaction, collaborative behavior, social support, and sense of community, were identified as key constructs or themes in 11 of the studies reported above. In addition, seven studies explicitly addressed student motivation. Less than half of these studies, however, examined the correlation between relatedness and motivation. Furthermore, no studies attempted to manipulate students' relatedness. The omission of documented trustworthiness in the qualitative studies and the lack of intervention-based experiments in the quantitative investigations also calls into question the quality of the reported results.

This study sought to address the limitations of the current literature in three ways. First, this study examined the correlation between relatedness and motivation. Second, in order to extend and improve upon the existing research, this study implemented an asynchronous online discussion intervention to test the effects of manipulating students' access to a relatedness-supportive learning community. Lastly, this study addressed the lack of rigor in the extant literature by adopting established procedures to ensure reliability, validity, and trustworthiness. It should also be noted that the intervention

examined in this study was informed by Ryan and Deci's (2000) firmly substantiated SDT and tested using a robust pretest-posttest experimental design.

As mentioned above, most SDT research has been conducted in traditional classroom settings, not TREs. Furthermore, empirical investigations of relatedness-supportive intervention are lacking. Given that the literature on relatedness support in TREs is underdeveloped, the question becomes how have traditional learning environments been manipulated to foster relatedness and what similar approaches can be used in TREs? The next section offers commentary on student relationships and introduces online networking interventions, specifically targeting relatedness in TREs.

Student Relationships and Networking Interventions

An established advantage of SDT is its ability to generate prescriptions to enhance motivation (Ryan & Deci, 2004); however, to date, few SDT-based recommendations have been advanced to promote relatedness in TREs. To this end, Peltier, Schibrowsky, and Drago (2007) noted that "much of what has been written about online education has focused on 'how to' articles and those using case studies or anecdotal evidence" (p. 141). Nevertheless, Rienties et al. (2009) suggested that learning in TREs can be more difficult than in a traditional classroom, and therefore, additional relatedness support in these settings may prove beneficial for fostering educational outcomes. The challenge of facilitating optimal learning is further addressed below, first by analyzing the relevant educational interactions in TREs, followed by commentary on the importance of building peer relationships and the various possibilities for student networking interventions.

Types of Interaction

Moore (1989) identified three types of interactions that occur in TREs: student-content, student-teacher, and student-student. These dyads delineate the ways educational interactions can be supported online. Often viewed as the defining characteristic of education, student-content interactions have been emphasized in technology-medicated distance education programs since the early email-based courses of the 1970s (Harasim, 2000). To date, student-teacher interactions have also received considerable attention in both traditional educational settings and TREs. From this perspective, the teacher is responsible for creating an environment that supports optimal learning and engagement (Garrison & Anderson, 2011). Yet despite the importance of these two interaction types, this study was conducted from a student perspective, and therefore, the emphasis was on student-student interactions.

Given the origins of distance education in correspondence courses (Abbot et al., 2013), student-student interactions are a relatively new area of exploration in TREs (Garrison & Anderson, 2011). Nevertheless, among the three types of interaction described above, student-student interactions were found to be the most highly predictive of positive achievement outcomes (Bernard et al., 2009; Drouin, 2008). Accordingly, Gunawardena and McIsacc (2004) predicted that fostering student-student interactions will become the primary means of promoting student success in TREs. Put simply, students have social needs and providing opportunities for student-student interaction is essential (Münzer, 2003).

A number of scholars have also recently emphasized the importance of a fourth type of interaction in TREs: student-technology (i.e., student-interface; Hillman, Willis,

& Gunawardena, 1994). In an early review of the literature on distance education, Schlosser and Anderson (1994) concluded that the primary goal of TREs was to offer distance students an educational experience as similar as possible to that of on-campus students. However, it would be imprudent to assume that students who participate in TREs are blissfully unaware of the technology needed to facilitate classroom interactions. Furthermore, Hillman and his colleagues argued that if students lack the ability to use technology successfully in TREs, it is unlikely they will master the course goals. Likewise, Daniels and Stupnisky (2012) observed that the introduction of new course delivery options has made it increasingly necessary to consider the technological context of students' experiences as students are likely to respond to the technology itself. Turner (2001) also emphasized the importance of technological context. Based on his observations in various learning environments, Turner asserted that any investigation of TREs needs to consider students-technology interactions as a chief constituent of students' experiences, rather than a mere background variable.

Although student-technology interactions are important, students' technological experiences in TREs often overlap with student-student interactions. When technology is the overarching platform for student-student communication, it becomes more difficult to delineate between these interaction types. Regardless of the technological context, however, few practitioners would argue that student-student interactions are unimportant in educational settings.

The Importance of Building Student Relationships

Researchers have been studying student-student interactions and relationship development since the early 12th century (e.g., Allport, 1920). More recently, however,

the focus has been on how students connect with one another in TREs (for a review see Thurmond & Wambach, 2004). Even though this study used the SDT-based construct of relatedness to conceptualize the effects of student-student interactions on relationship development, it should be noted that social presence theory (Short, Williams, & Christie, 1976) is one of the most common models used to examine connections among individuals in TREs. Short et al. defined social presence as "the degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships" (p. 65). Therefore, when interaction is limited, students are unable to develop more than a surface-level awareness of each other's presence in the learning environment (i.e., copresence). However, Tu and McIsaac (2002) found that students' perceptions of social presence improved with an increase in the level of interaction that occurred within the TRE. In an earlier study, Garrison, Anderson, and Archer (2000) concluded that social presence was essential to academic success. Therefore, although this study used an alternative framework, the literature on social presence theory further validates the importance of relatedness development in TREs.

Even though previous research has shown that building and maintaining relationships can have a positive effect on student outcomes (e.g., satisfaction, achievement, and retention; Drouin, 2008), not all learners have the same desire to form connections with their classmates. The present study, like many others, made the assumption that students would benefit from greater feelings of relatedness; however, recent research suggests that this may not always be the case. To this end, Hopper (2003) asserted that there are some learners, termed solitary learners, who by temperament prefer individual work and independent thinking.

Brown (2001) found that these solitary learners are particularly prevalent in distance learning classes. Her study on virtual community building showed that relationship development simply did not happen unless students wanted it to happen. Qualitative data collected by Ke and Carr-Chellman (2006) further suggested that many learners in distance education programs do not value social bonds with peers. In point of fact, one student in Ke and Carr-Chellman's study said: "What is the point? I probably will never meet these people" (p. 259). Drouin (2008) also identified relationship avoidance as a theme that emerged in several representative quotes made by online learners, such as the following: "If I wanted community, I would have chosen a regular [face-to-face] class" (p. 279).

Several researcher have advanced plausible explanations for why some students devalue personal relationships in TREs. Cameron, Morgan, Williams, and Kostelecky (2009) suggested that part of the opposition to relationship development stems from online students' desire for anonymity. According to Cameron and his colleagues, anonymity is one of the primary reasons students choose to learn in an online format, thus attempts to encourage personal connections are often met with opposition. Taking a different approach, Orifici (1997) suggested that the extent to which students seek peer relationships is a function of their personality type. In particular, she claimed that highly extraverted students are more likely to prefer learning in cooperation with their peer (for a review of extraversion and the big five personality dimensions see John & Srivastava, 1999). Liu et al. (2007) discussed the issue of students' affinity for peer relationships from a more pragmatic perspective. They noted that many students in TREs are mature individuals with full-time jobs, and therefore, it should not be surprising that some

learners found investing time and effort into relationship development to be an "extra burden" (p. 17). Shackelford and Maxwell (2012) offered the following succinct summary of students' attitudes toward peer interaction in TREs: "Not all students will want or need to contribute, but the chance to connect personally . . . will benefit those who do participate" (p. 241).

In spite of the approach-avoidance dichotomy seen regarding peer relationships in TREs, Baumeister and Leary (1995) noted that individuals who share a common experience enjoy greater feelings of belongingness. By definition then, one of the drawbacks for distance students in TREs is that they do not have the same community membership associated with being an on-campus student (Duffy & Kirkley, 2004). Without that same sense of community, Duffy and Kirkley found that distance students may be uncertain "of how to proceed [with assignments], of how well the concepts need to be understood, of what is required, and of how much work is expected" (p. 117). In a traditional classroom, these understandings often develop informally as students talk to one another before and after class. Therefore, Duffy and Kirkley argued that an online community is important to help students conceptualize academic requirements. In short, learners must interact with their peers in order to make sense of what they encounter (Shackelford & Maxwell, 2012).

In a similar vein, Williams, Duray, et al. (2006) noted that working and learning online can be a lonely and frustrating experience when social interaction is limited. To this end, feelings of disconnection may lead to lower rates of success and retention in TREs (Rovai, 2002). Falloon (2011) also found that success in TREs can, in part, be attributable to students' regular and consistent interaction with one another. From a

cognitive development lens, regular social interaction in an educational setting may serve to expand learners' perspectives and promote collaboration (Drouin, 2008). In this regard, Wankel and Blessinger (2012) contended that teachers can encourage "a higher quality of effort among students by tapping into the ubiquitous human need to socialize, belong, and communicate" (p. 5).

There is an apparent connection between Wankel and Blessinger's (2012) viewpoint and the basic need for relatedness advanced in SDT. Simply put, student-student interactions promote learners' feelings of relatedness, which may in turn increase their motivation and academic performance. Despite the obvious benefits of promoting student relatedness, such SDT-based support strategies are undeveloped in the literature, especially in regard to TREs. To date, the application of SDT interventions has been limited to select learner-centered programs, including special education (Algozzine, Browder, Karvonen, Test, & Wood, 2001; Carter, Lane, Crnobori, Bruhn, & Oakes, 2011; Wehmeyer, Palmer, Shogren, Williams-Diehm, & Soukup, 2010), physical education (Chatzisarantis & Hagger, 2009), HIV training (Gillard & Roark, 2013), and tobacco cessation programs (Williams, McGregor, et al., 2006). The following section describes online networking interventions that focus on developing a sense of community among online and on-campus students, albeit not from the lens of SDT.

Online Networking Interventions

Many research studies focused on online learning have indicated that student-student interactions are essential for creating high-quality TREs (Bernard et al., 2009; Su, Bonk, Magjuka, Liu, & Lee, 2005; Swan, 2002); however, actual tests of classroom interventions are still rare. Most of the efforts in this line of research have examined

student participation in asynchronous discussion forums. This is an important connection between the current study and the extant literature on networking interventions. In one such study, Rabe-Hemp, Woollen, and Humiston (2009) compared online and on-campus student participation in large enrollment classes. The results indicated that when online discussion tools were not available, students in the affected modality felt disengaged and frustrated by what Rabe-Hemp et al. identified as their inability to create a sense of community. LaPointe and Gunawardena (2004) also tested the effectiveness of threaded discussion and found that greater levels of student interaction were associated with positive perceptions of learning outcomes. Using a case study approach, Rovai (2001) found that text-based online learning communities can be an effective mechanism for fostering a sense of belonging among distance students.

In addition to the studies involving threaded discussion, a number of researchers have examined synchronous interventions. Based on findings from a quasi-experimental investigation, Shield, Atweh, and Singh (2005) established that the use of synchronous tutorials in a research methods course was more effective for developing a sense of community among online students than on-campus students. Similarly, Hrastinski (2006) tested a synchronous instant messaging intervention and found that adopters operated with a higher level of participation in class than those who chose not to interact using the instant messaging tool. While these studies suggest that interventions can be used to encourage relatedness in TREs, the resulting relationships are often limited by the technology needed to facilitate peer interactions (Glazer & Wanstreet, 2011). Accordingly, the development of the relationships building intervention tested in this study makes an important contribution to the field.

Summary

This chapter focused on synthesizing research in four areas that underpin this investigation. First, the corpus of literature pertaining to TREs was examined, including studies of blended, asynchronous, and synchronous course delivery systems. Second, an overview of SDT was provided along with a discussion of the theory's tenability in traditional educational settings and TREs. Third, a methodological approach was used to analyze previous research on TREs that addressed relatedness and motivation. Lastly, select citations were introduced to contextualize this study in terms of the existing body of literature on student relationships and online networking interventions. Taken together, these sections not only frame the rationale for this study from a content perspective, but also justify the need for empirical investigation to addresses existing issues concerning student relatedness in TREs.

With regard to content, this analysis revealed a number of areas that have not been fully addressed in the extant literature. In the first section, the argument was made that although the variety of available TRE platforms continues to expand, most research in this area has focused on a single delivery mode, and no previous studies have attempted to implement an asynchronous online discussion intervention in established synchronous hybrid programs. In the second section, evidence was offered to support the appropriateness of the SDT framework for this study, and accordingly, the novelty of SDT-based research on synchronous hybrid delivery systems was also highlighted. The third section identified three shortcomings in previous research that were explicitly addressed by this study, namely the correlation between relatedness and motivation, the implementation of a targeted intervention, and the application of SDT. In the fourth and

final section, background information was provided to frame the current intervention study, which was determined to be a unique contribution to the existing research on relationship building in TREs.

With regard to establishing a need for empirical investigation, this analysis identified the following issues that were uniquely addressed by this study, thereby underscoring its significance. The first section emphasized that despite the evolution of blended, asynchronous, and synchronous course delivery options, feelings of isolation remain a major issue that should be more extensively explored by forthcoming research on TREs. The previous SDT research reported in the second section showed that support for the basic psychological needs can promote learning and achieving; however, documenting additional evidence regarding the effects of relatedness support represents a significant contribution to the field. The third section revealed that the correlation between relatedness and motivation in TREs is not well established and that further empirical examination of this linkage could benefit both teachers and learners. Lastly, the fourth section provided strong justification for the current study by highlighting the importance of relatedness in traditional educational settings as well as TREs.

To summarize, this study extended the understanding of student relatedness in TREs in that it used an established framework (SDT) to develop and implement an easily adaptable intervention (asynchronous online discussion) in an emerging delivery mode (synchronous hybrid learning environments). In the next chapter, the methods and research design that guided this study are discussed.

CHAPTER III

METHOD

This study examined how participation in an asynchronous online discussion intervention affected students' feelings of relatedness and self-efficacy for relatedness development in synchronous hybrid learning environments. Quantitative techniques were used to test the tenability of Ryan and Deci's (2000) self-determination theory (SDT) in this emerging delivery mode. In addition, thematic analysis was used to synthesize the qualitative statements students made regarding their experiences in the online discussion intervention. This study used a convergent parallel mixed methods design that involved concurrent implementation of quantitative and qualitative research strands. As enumerated below, this study addressed seven research questions, six quantitative and one qualitative.

1. Do the bivariate linear relationships posited by SDT manifest within the synchronous hybrid learning environment?
2. Do online and on-campus students have different pretest scores on any of the study variables?
3. Do online and on-campus students have different posttest scores on any of the study variables?
4. Do relatedness and SERD scores differ between the pretest and the manipulation check for students in the experimental group?

5. Do relatedness and SERD scores differ between the pretest and the posttest for students in the experimental group?
6. Do relatedness and SERD scores differ between the pretest and the posttest for students in the control group?
7. What themes emerge regarding the qualitative statements made by students who participated in the asynchronous online discussion intervention?

It should be noted that this study was the researcher's third investigation in a program of research examining the antecedents of success in synchronous hybrid learning environments. In addition to yielding important insights regarding the social context of this emerging delivery mode, the prior studies served to pilot test the methods and refine the research questions. This chapter provides commentary on the research context, pilot tests, participants, procedures, and measures, followed by a discussion of the mixed methods approach, legitimation techniques, and main analyses.

Research Context

This study was conducted at a large U.S. midwestern research university. In order to improve student access, this institution has transitioned several of its programs to the synchronous hybrid delivery format. In particular, this study focused on the synchronous hybrid Masters of Business Administration (MBA), Masters of Public Administration (MPA), and Masters of Aviation (MS-Avit) programs. These programs use Adobe Connect™ web-conferencing software to provide simultaneous instruction to mutually exclusive groups of online and on-campus students.

The synchronous hybrid systems used in these programs are essentially identical. Specifically, each MBA, MPA, and MS-Avit class has a group of local students who

attend on-campus as well as a group of distance students who attend online via the implemented Adobe Connect™ web-conferencing interface. The web-conferencing system used in these programs is configured to simultaneously transmit a two-way, live audio and video feed between the local site and the distance students who are logged into Adobe Connect™. The instructor and the on-campus students are simultaneously present at the local site. Once students enroll in either the online or on-campus delivery option, they are not permitted to switch between attendance modes because different program fees are allocated to students in each subset of the synchronous hybrid course. Furthermore, bandwidth constraints restrict students from participating in multiple delivery modes during a given term.

Pilot Testing

Initial Cross-Sectional Study

The initial pilot study was conducted during the Spring 2013 semester using a mixed sample of current synchronous hybrid MBA students and recent program graduates. This investigation was the Year 1 study in the principal investigator's ongoing program of research on synchronous hybrid learning environments. The purpose of this initial cross-sectional study was to quantitatively explore the relationships among the variables that comprise the SDT framework. Data were collected using an online survey that combined previously validated scales from various sources. In particular, the resulting instrument measured participants' basic psychological needs (autonomy, competence, and relatedness; Ilardi, Leone, Kasser, & Ryan, 1993), motivation (intrinsic, identified regulation, introjected regulation, external regulation, and amotivation; Vallerand et al., 1992), and perceived success (Hall et al., 2004). Significant differences

were found between current students and recent graduates on all of the study variables. Accordingly, recent graduates were excluded from the analysis, and the decision was made to focus on current students for all future research efforts in this area.

In addition to refining the sampling frame, this study also severed to test the quality of the measurement instruments. Ilardi et al.'s (1993) Work Motivation Form-Employee (WMF-E) scale was found to have poor internal reliability and in subsequent data collections it was replaced with a scale developed by Van den Broeck, Vansteenkiste, De Witte, Soenens, and Lens (2010). All of the other measurement instruments were found to be internally reliable, and therefore, were retained for future research.

Correlational results from the Year 1 study supported the use of the SDT framework for future research on synchronous hybrid learning environments. The results also indicated that online students felt less relatedness than their on-campus counterparts (Butz et al., 2014). Relatedness mean scores, *t* values, and standard deviations for this comparison are reported below along with those observed during the subsequent mixed methods longitudinal study. Indeed, this finding regarding relational deficiencies became the impetus for the next phase in this program of research, wherein mixed quantitative and qualitative methodologies were used to examine SDT in synchronous hybrid learning environments.

Mixed Methods Longitudinal Study

The second study in this program of research adopted a mixed methods longitudinal design (quan→ QUAL → QUAN; Creswell & Plano Clark, 2011). The purpose of this multiphase mixed methods study was to provide a more complete account

of the social context in synchronous hybrid programs using both quantitative and qualitative methods (Bryman, 2006). In terms of participants, this Year 2 study expanded the sampling frame from exclusively MBA students to include current students enrolled in the synchronous hybrid MPA and MS-Avit programs. The data collection procedures included three quantitative surveys, which were administered in the Fall 2013, Spring 2014, and Summer 2014 terms. Interviews with students and faculty members were also conducted during the Spring 2014 term. Specifically, the qualitative data were generated via semi-structured face-to-face interviewing and online Adobe Connect™ focus groups.

The online survey used for Year 2 was revised based on the results of the initial cross-sectional pilot study. The final instrument again used a combination of established scales to assess students' psychological needs (Van den Broeck et al., 2010), motivation (Vallerand et al., 1992), and perceived success (Hall et al., 2004). These scales were found to be internally reliable, thus no further revisions were made to the instrument for this dissertation study. A full description of the measures used in the current study is presented later in this chapter.

Similar to the results of Year 1, data collected during Year 2 indicated that online students reported significantly lower levels of relatedness than on-campus students. This trend was consistently observed at each time point in this program of research, including the pilot study, $t(107) = 2.46$, $p < .05$; Time 1, $t(115) = 3.57$, $p < .001$; Time 2, $t(95) = 2.04$, $p < .05$; and Time 3, $t(63) = 1.71$, $p < .10$. Figure 8 provides a visual summary of the divergent relatedness scores observed for on-campus and online students during each semester of data collection.

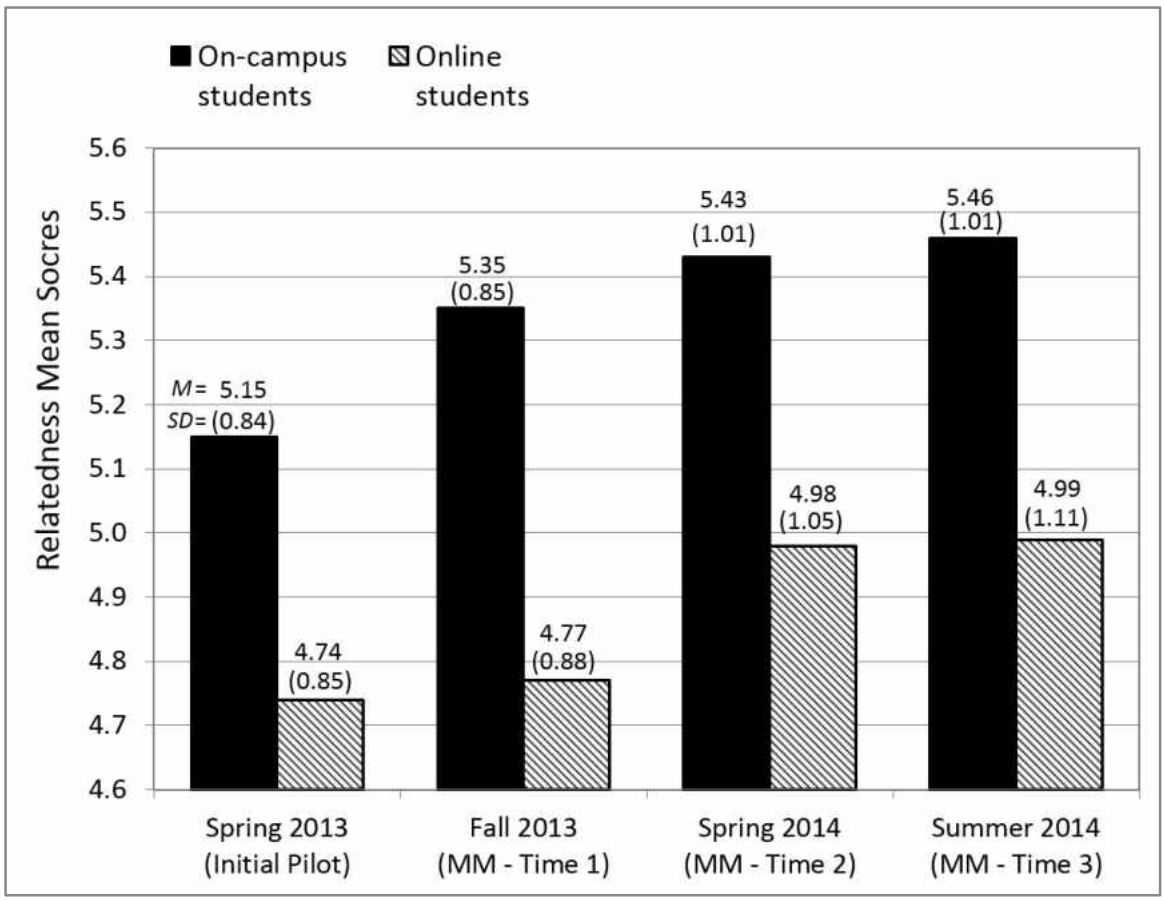


Figure 8. On-Campus and Online Student Relatedness Scores from Pilot Testing. All comparisons are significant at or below the 0.10 level.

Follow-up interviews with students and faculty members corroborated the quantitative findings regarding relational deficiencies in synchronous hybrid learning environments. One professor who has taught in the synchronous hybrid MBA program for seven years made the following comment:

> It is an ever-present challenge getting the off campus students to interact with the on-campus students. To this day, I don't have a strong sense that the students off campus bond in any significant way with the students on campus.

Another faculty member with three years of experience teaching in the synchronous hybrid MPA program attributed students' lack of relatedness to the technological disconnect between online and on-campus attendance modes: "If they had an opportunity

to cultivate a relationship or even interact with one another outside of the classroom, maybe things would be different." This quote was particularly influential for the conception of the current study.

Student voices echoed faculty members' concerns and provided additional details regarding relational opposition based on attendance mode. The following comment made by an on-campus student was representative of this emergent theme: "I don't feel like I'm really friends with the online people. For me, it's more of an obligation." The online students expressed a similar bias for developing relationships with classmates of the same delivery mode. To this end, one online student said, "There is just more camaraderie between those of us who are online."

In order to investigate these emergent patterns in more detail, quotation frequencies were calculated for participants' mentions of peer relationships. Statements that suggested the speaker was willing to seek out relationships were grouped into the approach category, whereas statements that implied a measure of resistance to forming relationships were grouped into the avoidance category. The results of this analysis revealed that quotations with reference to relationship avoidance were made more frequently about members of the opposite attendance mode, and quotations about seeking peer relationships were made more frequently about members of the same attendance mode (see Figure 9).

This finding regarding the evident preference for peer relationships with classmates of the same delivery format suggested that students' feelings of self-efficacy for developing relationships between and across attendance modes may be important for understanding their perceptions of relatedness. Using in vivo quotations from the student

interview data, the principal investigator developed the Self-Efficacy for Relatedness Development (SERD) scale to assess students' perceived ability in this domain. The 12 items that make up the SERD scale are equally divided into two subscales. The first subscale measures participants' self-efficacy for developing relatedness with peers online (SERD-OL), and the second subscale measures participants' self-efficacy for developing relatedness with peers on-campus (SERD-OC).

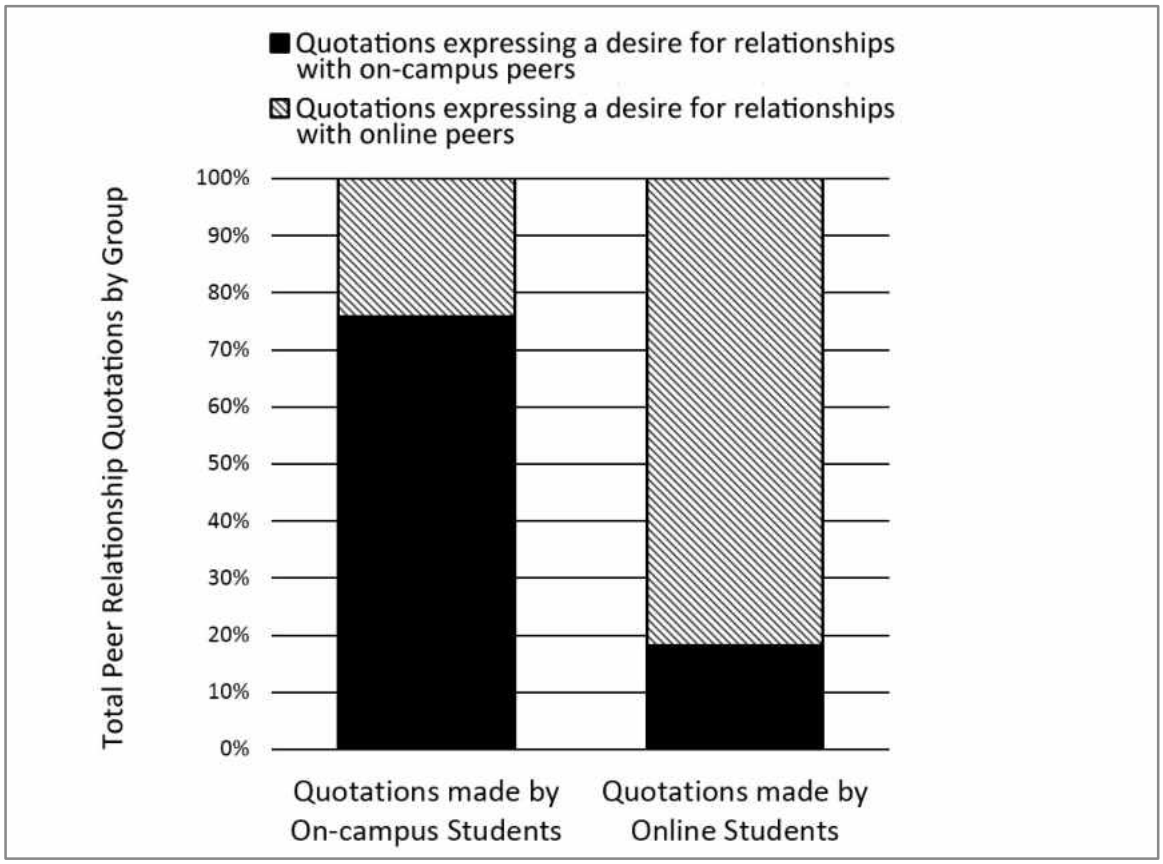


Figure 9. Quotation Frequencies for Relationship Development Observed During Pilot Testing. The left and right bars represent mutually exclusive sets of quotation made by on-campus and online students respectively. The total count of peer relationship quotations per group was 188 for the on-campus students and 257 for the online students.

Independent samples *t*-tests calculated with the quantitative data gathered during the Spring 2014 semester showed that, compared to students in the opposite attendance mode, participants reported significantly greater levels of self-efficacy for developing

relatedness with classmates in their same attendance mode (see Table 4). Furthermore, the results of Oblimin rotated exploratory factor analysis showed that the scale had good psychometric quality and could be used for future research in this area. Therefore, the SERD scale was included in the current study as an outcome variable.

Table 4. Group Differences Between On-Campus and Online Students on Self-Efficacy for Relatedness Development During Pilot Testing.

Dependent Variable	On-campus		Online		Mean Difference	*t*	*df*	*p*
	M	*SD*	*M*	*SD*				
SERD-OL	2.71	1.01	3.31	0.98	-0.60	-2.95	98	.004
SERD-OC[a]	4.07	0.76	2.65	1.09	1.43	7.48	91.53	.000***

Note. $N = 100$ participants (37 on-campus, 63 online). SERD-OL = Self-Efficacy for Relatedness Development Online; SERD-OC = Self-Efficacy for Relatedness Development On-Campus.
[a] $p < .05$ for Levene's test for homogeneity of variances.
***$p < .001$ (two-tailed).

The previous two studies established that relational deficiencies are a significant area of concern for synchronous hybrid programs. The current study expanded upon this finding by testing if synchronous hybrid students can improve their perceptions of relatedness, or their self-efficacy for relatedness development, by participating in an asynchronous online discussion intervention. The next section provides additional details regarding the study participants.

Participants

Participants for the current study were recruited from the synchronous hybrid MBA, MPA, and MS-Avit programs offered at a large U.S. research university. For the purpose of this study, synchronous hybrid students were identified as students currently enrolled in one or more synchronous hybrid course in the programs noted above. The three programs under consideration in this study have been offered in the synchronous

hybrid format since the 2006-2007 academic year. The MBA program requires students to complete 33 credits, the MPA program requires 35 credits, and the MS-Avit program requires 32 credits. Most full-time students are able to complete their program of study in two years; however, none of the programs offer a cohort system. Students in these programs are allowed to take courses in any sequence they desire. Although the MBA, MPA, and MS-Avit programs differ in terms of content and curriculum, all three programs aim to prepare students for upper-level positions in professional sectors of the economy. Therefore, this study did not seek to explore differences based on students' program affiliation.

All graduate students enrolled in the synchronous hybrid MBA, MPA, and MS-Avit programs were included in the sampling frame. In order to obtain the greatest possible sample size, no exclusion criteria were applied. Access to these students was granted by the individual program directors who allowed the principal investigator to administer the pre- and posttest surveys using the listservs maintained by each program.

In total, 99 of the 290 students contacted provided complete responses on the pretest survey (an initial response rate of 34.1%). As described later in this chapter, the pretest respondents were randomly assigned to experiment and control conditions for the intervention phase of this study. After the researcher closed the intervention, the 290 student sampling frame used for the posttest was contacted again via email to complete the posttest. The decision was made to administer the posttest to all of the students in the original sampling frame in order to collect additional descriptive data for the program directors. In total, 91 students provided complete responses on the posttest, however, not all of these individuals participated in the pretest. For the purpose of this study, only

students who completed both the pretest and the posttest were included in the analysis. To this end, a total of 83 students were retained in the dataset (a final response rate of 28.6%). In sum, 16 students who completed the pretests did not complete the posttest (attrition rate of 16.2%) and eight new participants joined the study during the posttest; however, their data were removed because they lacked matching pretest scores.

Despite the observed attrition rate between the pretest and posttest, an approximately equal number of students in both the experimental (n = 41) and control (n = 42) conditions contributed data at both time points. Furthermore, the overall dataset of 83 students satisfied Onwuegbuzie, Jiao, and Bostick's (2004) minimum suggested sample size of 82 participants for conducting survey research with two-tailed hypotheses. The decision to only include participants who provided both pre- and posttest data also largely mitigated any potential problems involving missing data. The SPSS Explore feature confirmed that only five students did not provide a complete response to one or more of the multi-item scales. These students were initially flagged as outliers. Closer examination, however, revealed that their survey data were within one or two items from being complete, and therefore, these students were retained for analysis. All remaining incidents involving incomplete responses were addressed with pairwise deletion in SPSS.

The final sample of online and on-campus students comprised a mix of males and females of various ages and ethnic groups. A complete account of the demographic characteristics of the participants is provided in Table 5. In addition to this descriptive information, participants provided data regarding their overall perceptions of the learning environment and their experiences within the program. A summary of participants' modality perceptions and program experiences is provided in Table 6.

Table 5. Participant Demographic Characteristics.

		Overall Sample $N = 83$		On-campus Students $n = 26$		Online Students $n = 57$		Experimental Group $n = 41$		Control Group $n = 42$	
Variable	Subcategory	Valid *n*	Valid %	Valid *n*	Valid %	Valid *n*	Valid %	Valid *n*	Valid %	Valid *n*	Valid %
Delivery Mode	On-campus	26	31.3	26	100.0	-	-	12	29.3	14	33.3
	Online	57	68.7	-	-	57	100.0	29	70.7	28	66.7
Gender	Male	50	60.2	14	53.8	36	63.2	23	56.1	26	61.9
	Female	33	39.8	12	46.2	21	36.8	18	43.9	16	38.1
Age in years[a]	20-29	45	54.2	17	65.4	28	49.1	23	56.1	22	52.4
	30-39	24	28.9	7	26.9	17	29.8	13	31.7	11	26.2
	40-49	11	13.3	2	7.7	9	15.8	4	9.8	7	16.7
	50+	3	3.6	0	0	3	5.3	1	2.4	2	4.8
Ethnicity[b]	White	74	89.2	22	84.6	52	91.2	35	85.4	39	92.9
	Black	2	2.4	2	7.7	0	0	1	2.4	1	2.4
	Amer Indian	1	1.2	0	0	1	1.8	0	0	1	2.4
	Mexican	3	3.6	0	0	3	5.3	1	2.4	2	4.8
	Asian	4	4.8	1	3.8	3	5.3	3	7.3	1	2.4
	Latino	1	1.2	0	0	1	1.8	0	0	1	2.4
English first language	Yes	74	89.2	21	80.8	53	93.0	37	90.2	37	88.1
	No	9	10.8	5	19.2	4	7.0	4	9.8	5	11.9
Program	MBA	53	63.9	13	50.0	40	70.2	25	61.0	29	69.0
	MPA	18	21.7	8	30.8	10	17.5	8	19.5	10	23.8
	MS-AVIT	12	14.5	5	19.2	7	12.3	8	19.5	3	7.1
Enrollment	Part-time	53	63.9	9	34.6	44	77.2	26	63.4	27	64.3
	Full-time	30	36.1	17	65.4	13	22.8	15	36.6	15	35.7

Note. Totals of percentages are not 100 for every characteristic because of rounding.

[a] Overall ($M = 31.18$, $SD = 8.08$); On-campus ($M = 28.38$, $SD = 6.71$); Online ($M = 32.48$, $SD = 8.38$); Experimental ($M = 30.88$, $SD = 7.83$); Control ($M = 31.83$, $SD = 8.78$).

[b] Totals differ from group sizes because participants were asked to choose all the apply.

Table 6. Participant Modality Perceptions and Program Experiences.

Variable	Subcategory	Response Range	Overall Sample $N = 83$		On-campus Students $n = 26$		Online Students $n = 57$		Experimental Group $n = 41$		Control Group $n = 42$	
			M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Experience with OL learning prior to prog	-	1 (none) to 5 (substantial)	1.92	1.33	2.23	1.48	1.77	1.24	1.93	1.39	1.95	1.29
Credits completed in synch hybrid prog	-	0 (first term) to 33 (last term)	15.24	11.59	16.08	12.42	14.86	11.28	15.02	12.80	14.67	10.39
Term GPA[a]	Fall 2014	0.00 (F) to 4.00 (A)	3.63	0.40	3.78	0.50	3.57	0.66	3.64	0.44	3.62	0.36
Perceived favorability of delivery modes	OC delivery	1 (low) to 5 (high)	4.13	0.95	4.46	0.91	3.96	0.94	4.00	0.99	4.32	0.76
	OL delivery		3.80	0.99	3.42	1.06	3.96	0.93	3.85	1.03	3.85	0.88
Desire for peer connections	with OC peers	1 (not at all) to 5 (very much)	3.47	1.17	4.04	0.96	3.20	1.18	3.48	1.24	3.44	1.16
	with OL peers		3.16	1.19	2.64	1.38	3.39	1.03	3.15	1.25	3.10	1.10

Note. OC = On-campus, OL = Online. Independent samples *t*-tests showed that on-campus and online students reported higher delivery mode favorability and a greater desire for peer connections when they responded to these items in reference to their own attendance mode ($p < .05$). The experimental and control groups did not differ in terms of the modality perception or program experience variables reported above.

[a] GPA mean scores were calculated using the following subsets of students who gave special consent to share their GPA data: Overall ($n = 55$); On-campus ($n = 16$); Online ($n = 39$); Experimental ($n = 28$); Control ($n = 27$).

Procedures

The procedures for this study involved administering a pretest and posttest to a sampling frame of graduate students enrolled in established synchronous hybrid programs offered at a large U.S. research university. Approval to conduct this study was obtained from the Institutional Review Board (IRB) at the university where the synchronous hybrid programs were offered. Documentation of IRB approval is provided in Appendix A.

The primary research activities for this study were conducted within one 16-week semester with a 5-week interval between the pretest and posttest measurement times. An asynchronous online discussion intervention occurred sequentially in the middle of these two quantitative data collection points. A timeline of the key dates and actions pertaining to this investigation is presented in Appendix B. The following discussion provides additional details regarding recruitment producers, experimental design, participation incentives, and the asynchronous online intervention protocol.

Recruitment and Experimental Design

Three weeks after the start of the Fall 2014 semester, 290 synchronous hybrid students (127 = MBA, 116 = MPA, 47 = MS-Avit) were sent an email containing a hyperlink to access the online pretest survey. The recruitment email was sent using the listservs maintained by each program. Additional recruitment efforts involved oral presentations of the study given by the principal investigator during prescheduled visits to synchronous hybrid classrooms. In total, 20 oral presentations were given throughout the pretest data collection. Participation in this study was voluntary, and although incentives were offered, these rewards were not excessive. The participation incentives are

discussed in greater detail later in this chapter. The online questionnaire was hosted through the Qualtrics™ survey engine. Students were asked to indicate their consent directly on the online survey prior to completing the pretest. The same informed consent document was used for the pretest and the posttest.

After three weeks of data collection, the researcher closed the online survey and extracted the data from the Qualtrics™ server. The pretest data were used to generate a list of students who indicated that they were willing to participate in the asynchronous online discussion intervention. A random number generator was used to assign consenting participants to the experimental group. In order to create a factorial experimental design that crossed attendance mode and treatment condition, both online and on-campus students were assigned to the experimental group using the approach described above (see Table 7).

Table 7. Factorial 2 x 2 Experimental Design.

	Group Membership	
Condition	Online	On-campus
Experimental	*n* = 29 Students who participated in the intervention (*Online* group membership only)	*n* = 12 Students who participated in the intervention (*On-campus* group membership only)
Control	*n* = 28 Students who did not participate in the intervention (*Online* group membership only)	*n* = 14 Students who did not participate in the intervention (*On-campus* group membership only

By design, the final experimental group consisted of approximately half of the online students and half of the on-campus students who provided pretest responses from each program. Students who were not willing to participate in the intervention were assigned to the control group along with consenting students who were not selected using the random number generator. Lastly, independent samples *t*-tests were performed using the pretest data to verify that the experimental and control groups did not have statistically different mean scores prior to the intervention ($p > .200$ for all study variables).

Once the groups were finalized, participants in the experimental group were emailed the informed consent document for the intervention. After acknowledging their consent, participants were enrolled in an online community site that served as the virtual space for the intervention. The MBA and MPA interventions were hosted in Blackboard™ and the MS-Avit intervention was hosted in eZ™. These platforms were chosen for the asynchronous discussion intervention because both the Blackboard™ and eZ™ learning management systems were endorsed by the university where the research was conducted. Therefore, it was anticipated that participants would feel more comfortable interacting using a familiar interface. In particular, the discussion format was chosen over blogs or wikis because discussion boards are more conducive to dialogic exchanges (Fichter, 2005). Students in the experimental group were given four weeks to participate in the asynchronous online discussion activity and complete an exit-survey manipulation check.

The purpose of the exit-survey manipulation check was to collect quantitative and qualitative data from participants directly following the intervention. In terms of

quantitative data, the instrument measured participants' perceived relatedness and self-efficacy for relatedness development. In addition to these multi-item scales, students were also asked to respond to three open-ended, qualitative questions. The open-ended questions were included to elucidate the effectiveness of the intervention and help discern what the experience was like for the participants in the experimental group. Participants in the control group did not have access to the intervention, and accordingly, they did not complete the manipulation check. These students attended classes as normal without any auxiliary interaction opportunities.

One week after the close of the intervention, the same students who were initially contacted to complete the pretest were sent an email containing a hyperlink to access the posttest survey. The principal investigator again visited synchronous hybrid classrooms to give brief oral presentations about the study. In total, 18 oral presentations were given during the posttest data collection. Participation was voluntary, and just as with the pretest, rewards were offered to encourage students to respond. After three weeks of data collection, the principal investigator closed the posttest survey and extracted the data from the online server.

Participation Incentives

Participation in this study was incentivized through prize drawings and participant payments. The current study was the researcher's third investigation involving the same sampling frame of synchronous hybrid students, and therefore, rewarding participation was essential to mitigate survey fatigue. The incentives for this study were financed by an external grant obtained through the Learning Environments Across Disciplines (LEADS)

research partnership, which is funded by the Canadian Social Sciences and Humanities Research Council (SSHRC).

All three phases of this study (pretest, intervention, and posttest) were incentivized by Amazon.com gift cards. In particular, students who completed the pretest had their name entered into six drawings for $20 gift cards. Given that participating in the asynchronous online discussion intervention involved a greater time commitment, students in the experimental group who completed the required tasks were awarded a guaranteed payment in the form of a $20 gift card. In order to ensure maximal completion of the intervention tasks (one original post, two substantive replies, and the exit-survey manipulation check), the principal investigator monitored each student's progress and only issued payment once all of the requirements were met. An additional set of 25 drawings for $20 gift cards was used to incentivize the posttest. Students who completed the pre- and posttest were also entered into a grand prize drawing for a $250 gift card. All prize redemption codes were distributed to the winners via email. Table 8 provides a summary of the costs that were incurred in order to offer participation incentives.

Table 8. Summary of Costs Associated with Participation Incentives.

Data Collection Phase	Incentive Type	Winner Selection Procedure	Value	Quantity	Total Cost
Pretest	Amazon.com gift card	Random drawing	$20	6	$120
Intervention[a]	Amazon.com gift card	Guaranteed payment	$20	39	$780
Posttest	Amazon.com gift card	Random drawing	$20	25	$500
Combined Pre/Posttest[b]	Amazon.com gift card	Random drawing	$250	1	$250
				Total	$1,650
				Portion of LEADS grant allotted for participation incentives in Year 3	$1,731
				Surplus	$81

Note. [a] In total, 41 students completed the intervention requirements; however, two participants requested not to receive payment for their efforts.
[b] Only participant who completed both the pertest and posttest were eligible to win the grand prize of $250.

Intervention Protocol

This study examined the perceptions of synchronous hybrid students over the course of one 16-week semester. Participants were randomly assigned to either the experimental or control condition, with an auxiliary asynchronous online discussion activity administered to students in the experimental group. Accordingly, participants had slightly different experiences over the course of the term based on their group membership. Figure 10 provides an overview of the study protocol for both the experimental and control conditions.

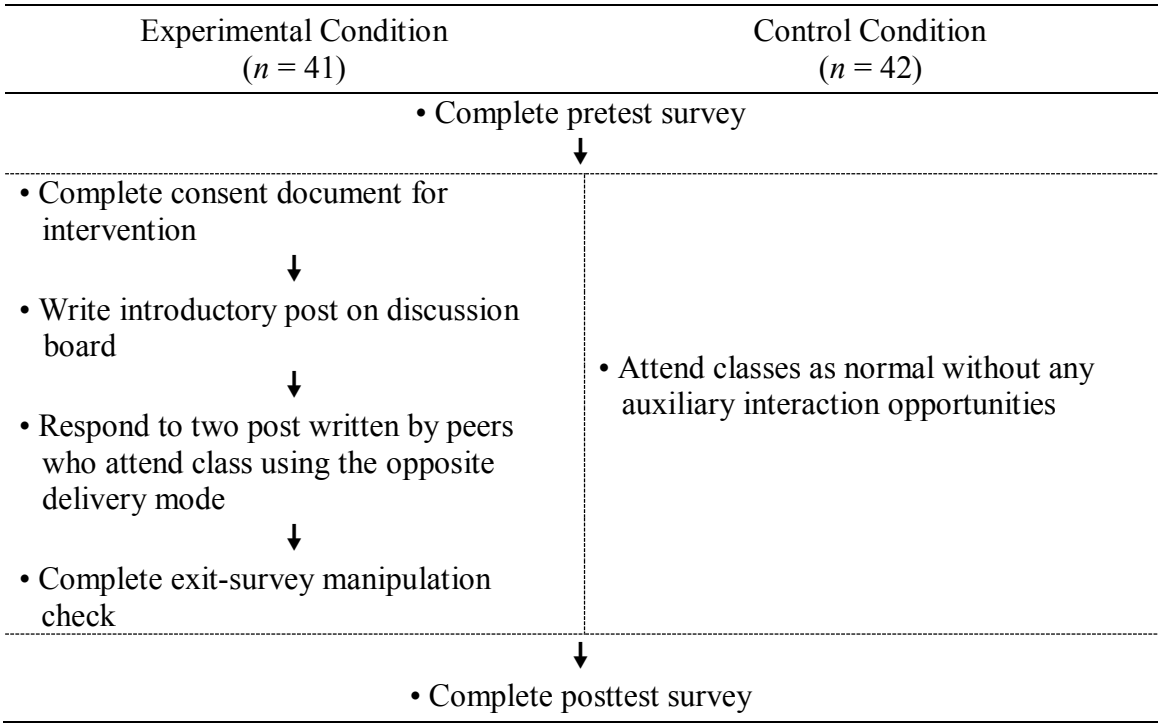
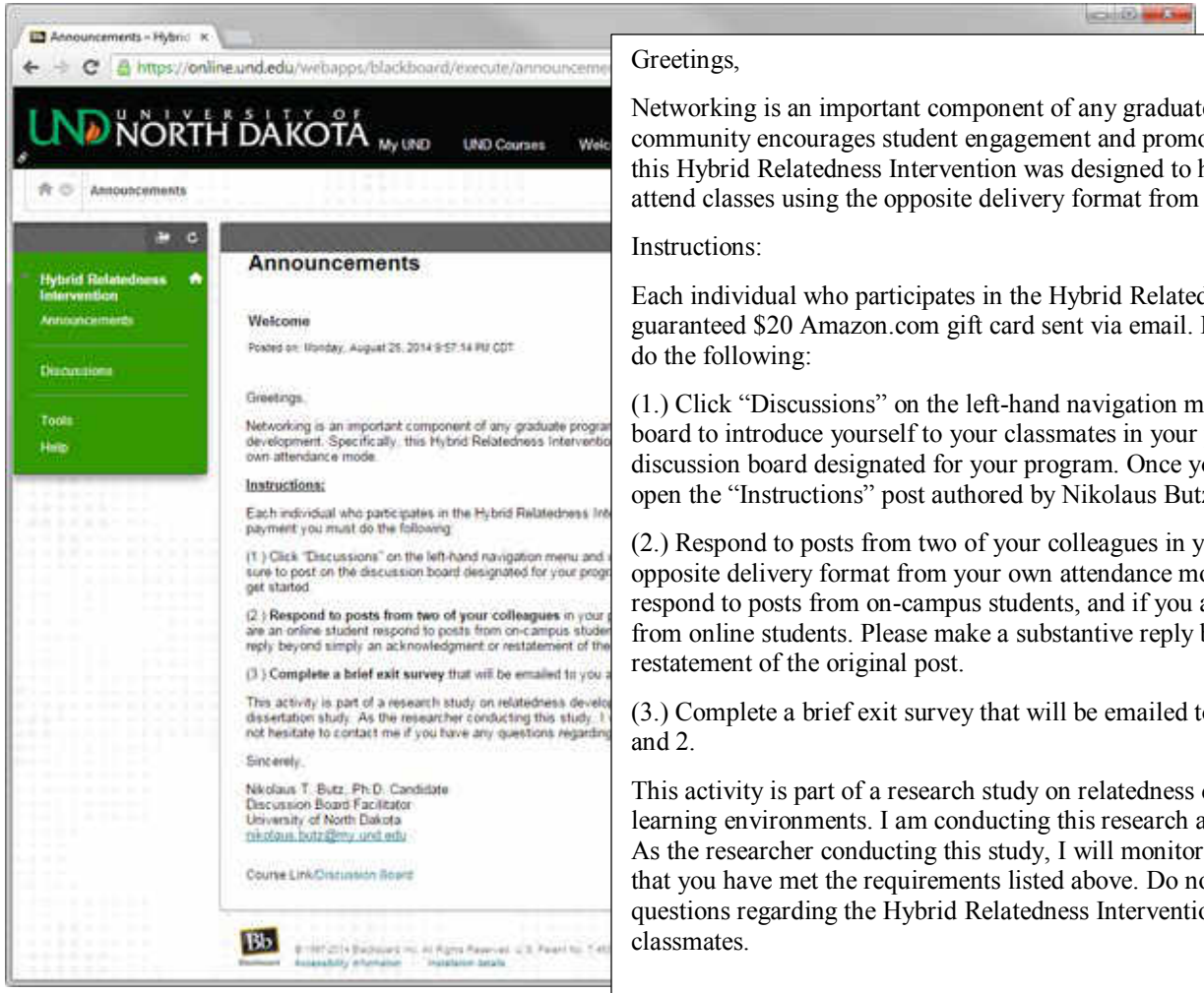


Figure 10. Study Protocol for Experimental and Control Conditions.

The discriminating factor between the study conditions was the asynchronous online discussion activity administered to the experimental group. This asynchronous online discussion activity was branded as a Hybrid Relatedness Intervention (HRI). The goal of the HRI was to provide students with a common virtual space wherein they could

connect with peers who attend classes using the opposite delivery format. This goal was chosen because the previous two studies in this program of research found relational discrepancies based on attendance mode to be a significant area of concern for synchronous hybrid students. However, given that some students may not have perceived relational discrepancies as a problem, the goal of the HRI was explicitly stated in a brief welcome message (see Figure 11). According to Palloff and Pratt (1999), clearly stating the desired outcome of an implemented intervention is essential for encouraging student buy-in of relatedness building activities. The initial welcome message also contained a hyperlink to the main discussion page. It was from this page that participants selected the discussion board that pertained to their program (MBA or MPA; the MS-Avit intervention was hosted on a separate platform, see Figure 12).

After entering the appropriate discussion board, students were presented with detailed instructions regarding the expectations that must be met in order to receive payment for their participation (see Figure 13). In order to receive compensation, students were required to write an introductory post containing information regarding: (a.) their current career or future career goals, (b.) their family or hobbies, and (c.) their impressions of the program, including dialogue about completed classes as well as the delivery format. In order to elicit more focused discussion on specific program experiences, students were invited to comment on the best course they have taken thus far and why they enjoyed it. In addition to the dialogic components described above, students were also encouraged to attach a photo of themselves or something that represents their interests.



Greetings,

Networking is an important component of any graduate program, and this social learning community encourages student engagement and promotes relatedness development. Specifically, this Hybrid Relatedness Intervention was designed to help students connect with peers who attend classes using the opposite delivery format from your own attendance mode.

Instructions:

Each individual who participates in the Hybrid Relatedness Intervention will be paid a guaranteed $20 Amazon.com gift card sent via email. In order to receive your payment you must do the following:

(1.) Click "Discussions" on the left-hand navigation menu and write one post on the discussion board to introduce yourself to your classmates in your program. Make sure to post on the discussion board designated for your program. Once you are in the correct discussion board, open the "Instructions" post authored by Nikolaus Butz to get started.

(2.) Respond to posts from two of your colleagues in your program who attend class using the opposite delivery format from your own attendance mode. That is, if you are an online student respond to posts from on-campus students, and if you are an on-campus student respond to posts from online students. Please make a substantive reply beyond simply an acknowledgment or restatement of the original post.

(3.) Complete a brief exit survey that will be emailed to you after you have completed Steps 1 and 2.

This activity is part of a research study on relatedness development in synchronous hybrid learning environments. I am conducting this research as a component of my dissertation study. As the researcher conducting this study, I will monitor the posts and issue payment once I see that you have met the requirements listed above. Do not hesitate to contact me if you have any questions regarding the Hybrid Relatedness Intervention. I hope you enjoy getting to know your classmates.

Nikolaus Butz

Figure 11. Screen Capture of Welcome Message Presented to Participants in the Hybrid Relatedness Intervention.

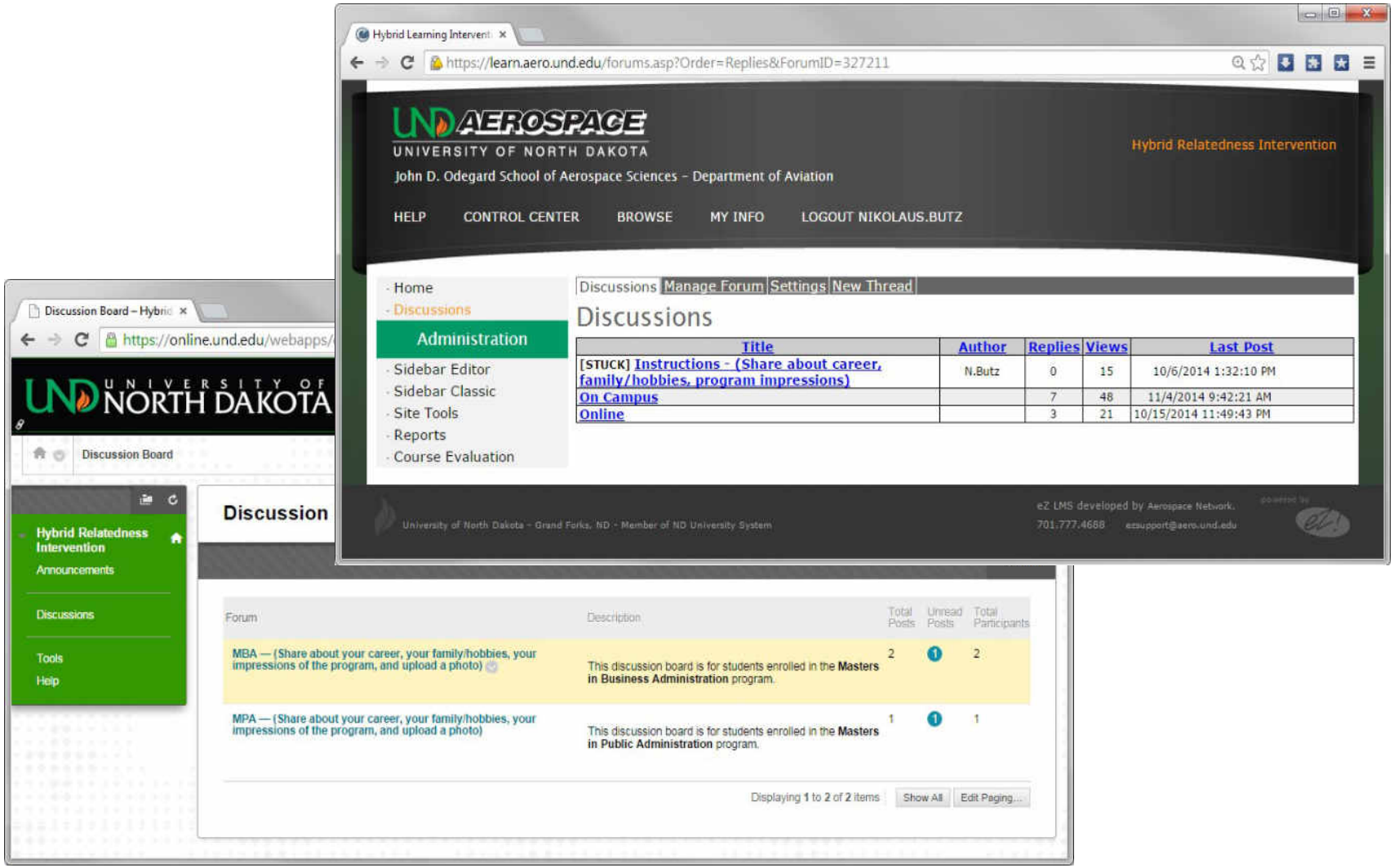
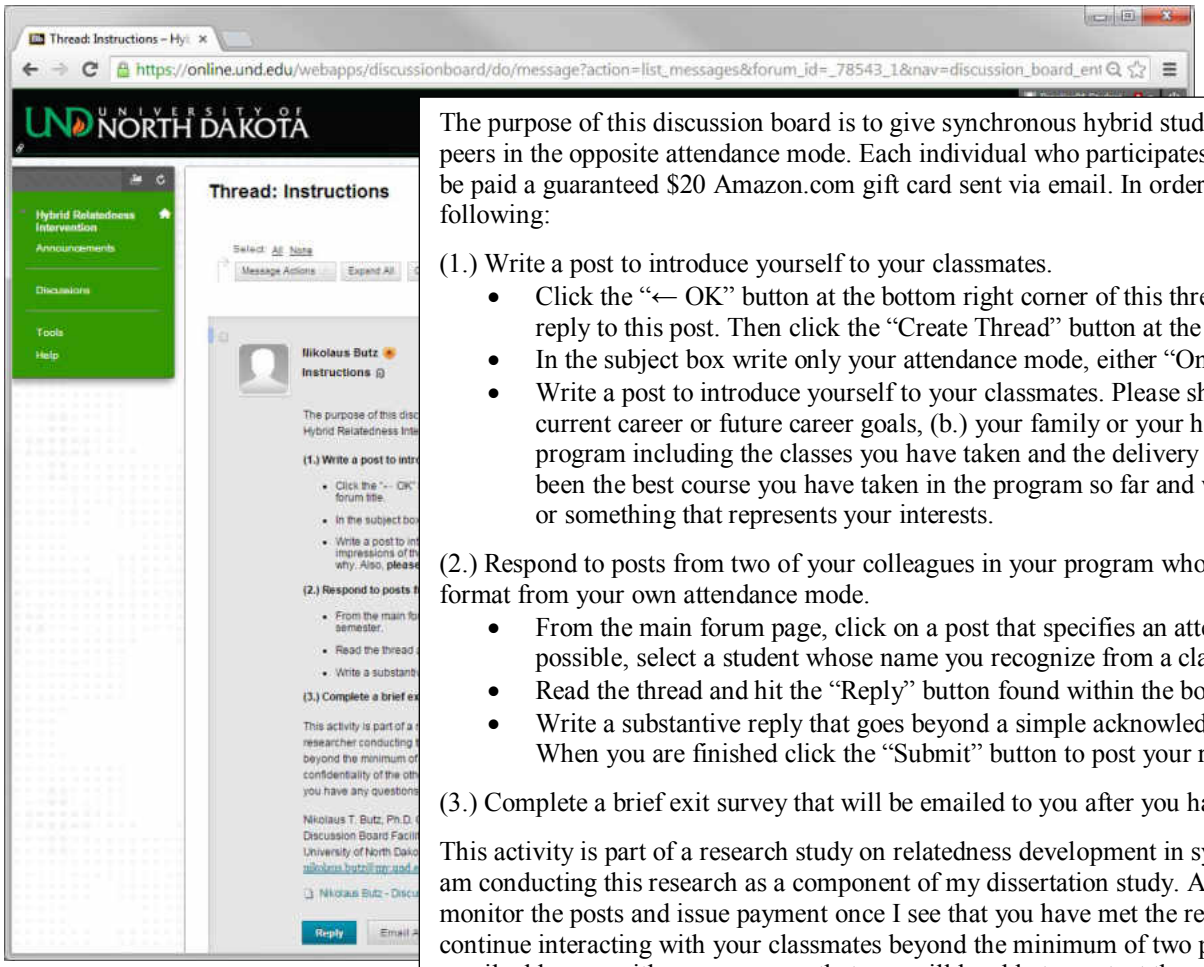


Figure 12. Screen Captures of the Main Discussion Pages Where Participants Select the Discussion Board that Pertains to Their Program.



The purpose of this discussion board is to give synchronous hybrid students the opportunity to network with their peers in the opposite attendance mode. Each individual who participates in the Hybrid Relatedness Intervention will be paid a guaranteed $20 Amazon.com gift card sent via email. In order to receive your payment you must do the following:

(1.) Write a post to introduce yourself to your classmates.

- Click the "← OK" button at the bottom right corner of this thread to return to the main forum page. Do not reply to this post. Then click the "Create Thread" button at the top left corner below the forum title.
- In the subject box write only your attendance mode, either "Online" or "On-campus."
- Write a post to introduce yourself to your classmates. Please share information on the following: (a.) your current career or future career goals, (b.) your family or your hobbies, and (c.) your impressions of the program including the classes you have taken and the delivery format. You may wish to discuss what has been the best course you have taken in the program so far and why. Also, please attach a photo of yourself or something that represents your interests.

(2.) Respond to posts from two of your colleagues in your program who attend class using the opposite delivery format from your own attendance mode.

- From the main forum page, click on a post that specifies an attendance mode opposite of your own. If possible, select a student whose name you recognize from a class you are taking this semester.
- Read the thread and hit the "Reply" button found within the box containing the author's original post.
- Write a substantive reply that goes beyond a simple acknowledgment or restatement of the original post. When you are finished click the "Submit" button to post your reply.

(3.) Complete a brief exit survey that will be emailed to you after you have completed Steps 1 and 2.

This activity is part of a research study on relatedness development in synchronous hybrid learning environments. I am conducting this research as a component of my dissertation study. As the researcher conducting this study, I will monitor the posts and issue payment once I see that you have met the requirements listed above. Feel free to continue interacting with your classmates beyond the minimum of two posts. You may also wish to exchange email addresses with your peers so that you will be able to contact them directly in the future. However, please respect the confidentiality of the other participants and refrain for discussing the content of the discussion boards outside of the Hybrid Relatedness Intervention. Please do not hesitate to send me an email if you have any questions regarding the Hybrid Relatedness Intervention. I hope you enjoy getting to know your classmates.

Figure 13. Screen Capture of Participation Instructions.

The guidelines for authoring an introductory post were adapted from a series of online professional development courses offered by EdTech Leaders Online (2014), which is a nonprofit organization focused on promoting best practices in online teaching and learning. Students were required to title their posts in a way that identified them as either an online or an on-campus student. After students had written their introductory posts they were asked to respond to entries from two peers in their program who attend classes using the opposite delivery mode (see Figure 14). This requirement aligned with Pallofff and Pratt's (1999) recommendation that asynchronous relationship development interventions should specify a minimum level of participation. Furthermore, the one-plus-two, post-reply approach used in this study has been previously tested and found to be effective for promoting participation in threaded discussions (Stepich & Ertmer, 2003). In particular, Stepich and Ertmer observed that having students post introductions helped them to find commonalities, which they could then build on throughout the semester.

For this study, students were asked to select interaction partners whose name they recognized from the classes they were enrolled in at the time of the intervention. This requirement was necessary because the intervention was intended to improve relational deficiencies among classmates who previously lacked the opportunity to connect due to their divergent attendance modes. That is, the intervention was not meant to be a tool for promoting the development of new relationships among individuals who had not previously met. Specifically, this study sought to determine if the auxiliary interactions in the experimental group improved relatedness or self-efficacy for relatedness development beyond the experiences of the control group, which were confined to typical instances of peer interaction that occurred within the context of the program.

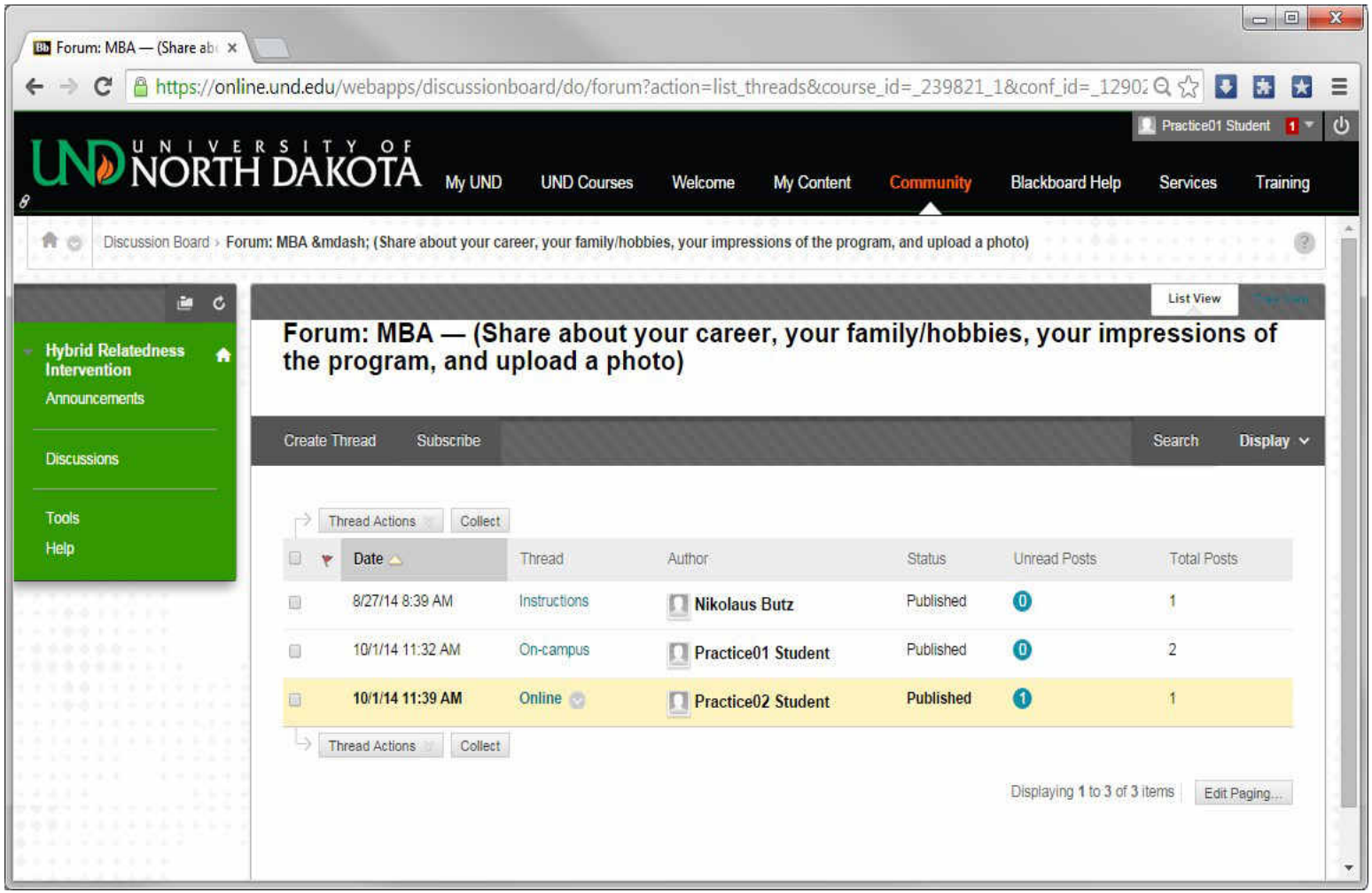


Figure 14. Screen Capture of the Discussion Board Where Participants Respond to Posts Written by Peers Who Attend Classes Using the Opposite Delivery Mode.

Despite the careful design of this intervention, it should be noted that some social presence theorists may argue that writing an introductory post and replying to peer-authored comments falls short of the authentic connections that characterize true relatedness. According to social presence theory (Short et al., 1976), a one-time intervention such as this would more realistically address an individual's perception of copresence. Although copresence is now commonly associated with social presence theory (for a discussion on copresence and social presence see Nowak, 2001; Nowak & Biocca, 2003), the term originally emerged through the work of Goffman (1963). According to Goffman, individuals experience copresence when they are aware of others in the environment and others are also mutually aware of their presence. The tested intervention targeted a higher level of relatedness development by allowing participants to express their personality beyond that of the anonymous others they may encounter in the typical classroom setting.

In order to provide students with an open platform to express their personality without interference, the role of the principal investigator in the intervention was limited to that of an observer. This limited-involvement approach was based on the work of Drouin (2008), who asserted that researchers investigating online social interactions should withhold their involvement to allow students to develop their own interaction pattern. The one exception in this study, however, was that students in the experimental group were sent a weekly participation reminder email until they completed the intervention requirements.

Once a student completed the intervention, he or she was sent an email containing a hyperlink to a brief exit-survey manipulation check. This survey comprised both

quantitative and qualitative items. First, multi-item scales were used to quantitatively assess students' perceptions of relatedness and self-efficacy for relatedness development directly following the intervention. Second, open-ended, qualitative questions were used to generate data regarding the effectiveness of the intervention for promoting student relatedness and self-efficacy for relatedness development. These open-ended items were only administered to the experimental group on the manipulation check survey; however, the quantitative measures were also included on the pre- and posttests. A more detailed discussion of the measures is presented below.

Measures

The survey instruments administered in this study were designed by the principal investigator to address the research questions; specifically, the instruments were comprised of a collection of previously validated scales adapted from other sources. The only exception was the SERD scale, which was developed by the principal investigator. Identical pre- and posttest surveys were administered in order to identify potential changes in the measured variables over the course of the study. The questionnaire components included participant attributes (demographics and program experiences), potential control variables (frequency of computer problems and extraversion), self-efficacy for relatedness development (with online and on-campus students), basic psychological needs (autonomy, competence, and relatedness), motivation (intrinsic, identified regulation, introjected regulation, external regulation, and amotivation), and perceived success (program experience and technology use). Students' GPAs were also collected from university records. The complete survey instrument used for the pre- and posttest is presented in Appendix C.

In addition to the pre- and posttest, a brief exit-survey manipulation check (MC) was administered to students in the experimental group directly following their participation in the intervention. This exit-survey manipulation check assessed student relatedness and self-efficacy for relatedness development using the same multi-item scales that appeared on the pre- and posttests. Three open-ended items were also included on the manipulation check to generate qualitative date regarding the effectiveness of the intervention. The complete survey instrument used for the manipulation check is presented in Appendix D.

In total, the pre- and posttest surveys consisted of 107 items. Of these measures, 26 items were repeated on the manipulation check. Table 9, presented below, offers an overview of the survey items as well as identifies the variable abbreviations used throughout the study. The following sections provide a detailed description of the study variables. This discussion includes source information for the established measures as well as an analysis of the psychometric properties of the independently developed SERD scale. Reliability coefficients are presented later in the chapter.

Background variables. Information was collected on a series of background variables in order to determine potential outside factors that may influence the outcome variables. These background variables also helped to describe the sample and create groups for analysis. In total, the background variables included 12 demographic questions (e.g., age, gender, ethnicity) and nine items that focused on participants' experiences within the hybrid environment (e.g., number of credit hours completed in the program).

Table 9. Summary of Survey Items.

Construct or Category	Subscales	Abbreviation	Total Items	Inclusions on Pre/posttest or MC[a]
System variables	—		9	Pre/posttest; 5 MC
Demographics	—		12	Pre/posttest
Program experience	—		9	Pre/posttest; 1 MC
Basic needs	Autonomy	Auton	8	Pre/posttest
	Competence	Compt	8	Pre/posttest
	Relatedness	Relate	8	Pre/posttest; MC
Tech failure events	—		1	Pre/posttest
Extraversion	—	Extravr	8	Pre/posttest
Self-efficacy of relatedness development	Online relatedness	SERD-OL	6	Pre/posttest; MC
	On-campus relatedness	SERD-OC	6	Pre/posttest; MC
Motivation	Intrinsic motivation	Intrin	4	Pre/posttest
	Identified regulation	Ident	4	Pre/posttest
	Introjected regulation	Introj	4	Pre/posttest
	External regulation	Extern	4	Pre/posttest
	Amotivation	Amot	4	Pre/posttest
Perceived success	Program experience	Prog	6	Pre/posttest
	Technology use	Tech	6	Pre/posttest
TOTAL ITEMS			107	

Note. [a] The manipulation check (MC) also included three open-ended questions.
[b] System variables are data from survey distribution, such as participants' IP addresses.

Control variables. The questionnaire was carefully designed to consider potential control variables. A single item was used to assess how often participants experienced computer problems while attending synchronous hybrid courses (1 = *Not at all*, 10 = *Very frequently*). In addition, eight items extracted from Rammstedt and John's (2007) abbreviated Big Five Inventory were included to measure participants' preferences for an extraverted social interaction style (1 = *Disagree strongly*, 5 = *Agree strongly*).

Self-efficacy for relatedness development. The independently developed Self-Efficacy for Relatedness Development (SERD) scale was included to assess students' feelings of self-efficacy to develop relatedness within and across attendance modes (1 = *Not at all true*, 7 = *Very true*). The items in this scale were developed using in vivo quotations from student interview data collected during pilot testing. The instrument assessed two dimensions, and in the initial deployment, each of the two subscales featured six items. The first subscale measured participants' self-efficacy for developing relatedness with peers online (SERD-OL), and the second subscale measured participants' self-efficacy for developing relatedness with peers on-campus (SERD-OC).

Unlike the established measures, which were accepted as valid based on previous empirical vetting, the SERD scale was developed internally, and further examination was required to ensure the items were acceptable in terms of content validity and psychometric quality. First, an exploratory factor analysis was conducted using SPSS 22 to examine the psychometric properties of the scale. All 12 items were entered simultaneously into an Oblimin rotated pattern matrix, and factors were extracted using decision criteria that satisfied Gorsuch's (1983) scree test and Kaiser and Caffrey's (1965) Kaiser's rule. Distinct iterations of this analysis were conducted with data from the pretest, manipulation check, and posttest. At each time point, the scree test and Kaiser's rule indicated a two-factor solution in which items separated out into the online and on-campus subscales with strong factor loadings (0.74 to 0.97) and high communalities (0.55 to 0.94).

Despite the favorable result of the factor analyses, the decision was made to also logically evaluate the content validity of the items on the SERD scale. In agreement with

Sirkin's (1999) guidelines for assessing content validity, the SERD scale was carefully reviewed to discern how well each item represented the dimensions of the overall construct. To this end it was determined that most of the items had good construct validity; however, two sets of items were found to be highly repetitive and were removed based on their limited contribution to the scale's overall dimensionality. In particular, Item 1, "I can bridge the gap to make connections with online/on-campus students," was removed due to its overlap with Item 5, "I am able to connect with online/on-campus students, regardless if I attend class online or on campus." Likewise, it was decided that Item 4, "I can develop social relationships with my online/on-campus classmates," was too similar to Item 6, "I have no problem developing relationships with online/on-campus students," and should be dropped from the scale. These decisions were also supported by the quantitative data as Items 1 and 4, on average, had the highest inter-item correlations across the scale.

After Items 1 and 4 were removed, an additional battery of factor analyses was performed using the same specification as described above. Again, both the scree test and Kaiser's rule indicated a two-factor solution with strong factor loadings (0.77 to 0.97) and high communalities (0.60 to 0.94). The extracted factors also separated the remaining items into the online and on-campus subscales. Eigenvalues and the percentages of variance for the original and revised SERD scales are presented in Table 10. In support of the scale modification, it was found that the cumulative percentage of variance explained by the revised SERD scale was higher than the original SERD scale at each time point. It should also be noted that both the original and revised SERD scale had Cronbach's alpha

values between 0.81 and 0.95. Specific Cronbach's alpha values for all of the study variables are presented later in this chapter.

Table 10. Eigenvalues and Percentages of Variance for the Original and Revised SERD Scales.

	Pretest		MC		Posttest	
Data Characteristics	Factor 1: On-Campus	Factor 2: Online	Factor 1: On-Campus	Factor 2: Online	Factor 1: On-Campus	Factor 2: Online
Original Scale						
Eigenvalue	5.82	3.97	5.36	3.70	5.97	3.73
% of variance	48.47	33.06	44.66	30.80	49.76	31.12
Cumulative %	48.47	81.53	44.66	75.46	49.76	80.88
Revised Scale						
Eigenvalue	4.05	2.49	3.73	2.41	4.10	2.51
% of variance	50.59	31.18	46.62	30.14	51.27	31.39
Cumulative %	50.59	81.77	46.62	76.76	51.27	82.66

Note. Pre- and posttest, $N = 83$; Manipulation check (MC), $n = 41$. The original scale included six items that were asked in reference to both online and on-campus delivery modes. The revised scale consisted of four items in reference to each delivery mode.

Need satisfaction. Van den Broeck et al.'s (2010) 24-item Work-Related Basic Need Satisfaction (W-BNS) scale was used to measure participants' perceived levels of need satisfaction. This scale was adapted to specifically assess the degree to which students felt their basic psychological needs were either satisfied or thwarted within the synchronous hybrid learning environment (1 = *Strongly disagree*, 7 = *Strongly agree*). Items on the W-BNS are distributed among three subscales: autonomy, competence, and relatedness.

Student motivation. This study adapted Vallerand et al.'s (1992) 20-item Academic Motivation Scale-College (AMS-C) to measure participants' motivation in their synchronous hybrid program. Participants were asked to indicate how closely each item corresponded with their experiences in synchronous hybrid learning environments (1 = *Does not correspond at all*, 7 = *Corresponds completely*). Consistent with SDT, the

instrument comprises five subscales intended to assess the following types of motivation: intrinsic, identified regulation, introjected regulation, external regulation, and amotivation. Although Ryan and Deci's (2000) SDT framework included integrated regulation as a type of motivation, it is not assessed by the AMS-C due to significant overlap with intrinsic motivation. This study also used external regulation as a surrogate for extrinsic motivation as it is the most outwardly focused regulatory style.

Perceived success. Participants' perceptions of success were assessed using six items adapted from Hall et al.'s (2004) Perceptions of Academic Success scale (1= *Very unsuccessful*, 7 = *Very successful*). Items on the scale were reframed to measure how successful students felt in the overall program and in using the technology required by the learning environment. For each scale, the six items were averaged with higher scores indicating greater perceived success.

Mixed Methods Approach

Formally defined, a mixed methods design is a research approach that involves "collecting, analyzing, and mixing both quantitative and qualitative data in a single study" (Creswell & Plano Clark, 2007, p. 5). In particular, the present study used a convergent parallel mixed methods design in which both quantitative and qualitative data were collected simultaneously, analyzed separately, and then merged into an overall interpretation (Creswell & Plano Clark, 2011). Accordingly, this investigation used multi-item scales and open-ended response items to concurrently collect differing, yet complementary, data on students' perceptions of relatedness in synchronous hybrid learning environments. The purpose of adopting a convergent parallel mixed methods

design was to produce triangulated results based on the multiple data sources used in this study (QUAN + qual = triangulation; Creswell & Plano Clark, 2011).

In terms of implementation, it should be noted that the quantitative strand was given priority over the qualitative inquiry. This decision was made because the research questions in this study were weighted such that six were quantitative and one was qualitative. Overall, the analysis procedures were guided by separate paradigmatic traditions based on the quantitative or qualitative foundation of each research question (Onwuegbuzie et al., 2007). In accordance with this approach, purposefully mixing of the results did not occur until the final interpretation of the findings.

Data Analysis

Data analysis was conducted in two phases. First, potential concerns regarding reliability, validity, and trustworthiness were addressed during the preliminary legitimation phase. In the second phase, specific analyses were conducted to address each of the research questions. A computation software suite, namely SPSS 22 (2013), was used to perform the quantitative legitimation procedures and answer the first six research questions. The seventh research question was addressed using ATLAS.ti (2014), a qualitative data analysis program.

Legitimation

According to Creswell and Plano Clark (2011), a mixed methods research study should be rigorous in both the quantitative and qualitative strands. To this end, the separate strands were held subject to an array of established techniques used to ensure quality within each paradigm. Although commonalities exist between the quantitative and qualitative conceptualization of research quality, the limited overlap in the terminology

(e.g., validity vs. trustworthiness) provides a challenges for mixed methods research (Teddlie & Tashakkori, 2003). Therefore, this study used the term *legitimation* as an "inclusive term" that refers to "the overall criteria for assessment of mixed research studies" (Onwuegbuzie & Johnson, 2006, p. 55).

In Onwuegbuzie and Johnson's (2006) discussion of legitimation, emphasis was placed on data integration and inferences; however, the present study adopted a more general definition. That is, the term was used to describe the process of establishing the "legitimacy of the qualitative and quantitative phases of the study" (Johnson & Onwuegbuzie, 2004, p. 22). As such, legitimation procedures were used to ensure the quantitative features of the study were valid and reliable and the qualitative features were trustworthy. The following discussion outlines the specific techniques that were used to establish reliability, validity, and trustworthiness.

Reliability. Prior to analysis, students' responses on the pretest, manipulation check, and posttest were merged into a single dataset. Concerns regarding reliability, or the quality of an instrument to yield consistent results, were addressed using three techniques: data screening, internal consistency reliability, and test-retest reliability. The results from these preliminary analyses are presented in Table 11.

The descriptive statistics, scale reliabilities, and test-retest coefficients suggested that all scales were of sufficient quality and could be used as measures for the variables of interest in this study. First, descriptive statistics, including skewness and kurtosis scores were examined to identify variables that were not normally distributed. According to D'Agostino, Belanger, and D'Agostino (1990), skewness and kurtosis values in excess of ±2 indicate a departure from normality. In the current study, only pre- and posttest

Table 11. Descriptive Statistics and Reliability Coefficients for Survey Items.

Data		Basic Needs			SERD		Motivation					Perceived Success	
Characteristic	Extravr	Auton	Compt	Relate	OL	OC	Intrin	Ident	Introj	Extern	Amot	Prog	Tech
Pretest													
M	3.22	4.85	5.64	5.03	3.09	3.20	5.34	5.36	4.17	4.94	1.80	5.42	5.69
SD	0.82	1.02	0.99	0.93	0.98	1.11	1.35	1.13	1.69	1.37	1.22	1.06	1.12
Skewness	0.14	0.20	-0.92	0.21	-0.25	-0.39	-0.58	-0.63	-0.25	-0.67	1.86	-0.54	-0.54
Kurtosis	-0.48	-0.71	0.94	0.00	-0.43	-0.47	-0.52	-0.10	-0.90	0.12	3.58	0.03	-0.57
α	0.89	0.88	0.89	0.82	0.92	0.93	0.94	0.74	0.91	0.80	0.94	0.94	0.98
MC													
M	-	-	-	4.96	3.51	2.93	-	-	-	-	-	-	-
SD	-	-	-	0.93	0.86	1.17	-	-	-	-	-	-	-
Skewness	-	-	-	0.42	0.15	0.02	-	-	-	-	-	-	-
Kurtosis	-	-	-	-0.33	-0.45	-0.72	-	-	-	-	-	-	-
α	-	-	-	0.85	0.81	0.95	-	-	-	-	-	-	-
Posttest													
M	3.32	4.73	5.59	5.00	3.23	3.08	5.26	5.44	4.27	5.06	1.82	5.45	5.82
SD	0.83	1.05	1.02	0.96	0.97	1.16	1.32	1.11	1.52	1.21	1.16	1.06	1.10
Skewness	0.21	0.24	-0.48	0.09	-0.08	-0.19	-0.61	-1.05	-0.29	-0.98	1.70	-0.63	-0.81
Kurtosis	-0.84	-0.39	-0.45	-0.36	-0.84	-0.94	0.03	1.46	-0.36	1.24	2.62	0.18	-0.15
α	0.90	0.90	0.92	0.87	0.90	0.95	0.92	0.79	0.89	0.80	0.88	0.93	0.97
Possible range	1-5	1-7	1-7	1-7	1-5	1-5	1-7	1-7	1-7	1-7	1-7	1-7	1-7
r between pre and posttest	0.87***	0.72***	0.67***	0.82***	0.78***	0.77***	0.79***	0.65***	0.71***	0.76***	0.64***	0.55***	0.51***

Note. Pre- and posttest, $N = 83$; Manipulation check (MC), $n = 41$.
***$p < .001$ (two-tailed).

amotivation scores were found to have exceeded this threshold with kurtosis values above +2. These abnormalities were caused by a disproportionally high number of participants with low amotivation scores. Such a frequency distribution was expected as students in advanced degree programs would not be anticipated to enroll while "lacking intention to act," which is the hallmark of amotivated behavior (Ryan & Deci, 2002, p. 17). Despite these peaked distributions, amotivation was retained for analysis. This decision was based on a careful review of previous studies that conducted similar statistical tests involving university students with high kurtosis scores for amotivation (e.g., 2.95, Brunel, 1999; 4.00, Sibley, Hancock, & Bergman, 2013). Aside from the exception discussed above, the descriptive statistics for the study variables indicated that the data were acceptable for analysis.

A second approach to ensuring reliability involved calculating Cronbach's alphas for the multi-item scales used in this study. As an indicator of reliability, Cronbach's alpha provides an estimate of the stability or consistency of the measures (Warner, 2013). Various sources have suggested that acceptable Cronbach's alpha values range from .70 to .95 (Bland & Altman, 1997; DeVellis, 2003; Nunnally & Bernstein, 1994). A pronounced majority of the variables in this study satisfied this criterion, demonstrating a high degree of consistency with the Cronbach's alphas that were observed during the pilot tests. It should be noted, however, that the observed Cronbach's alphas for perceived success for technology use surpassed the .95 threshold on both the pre- and posttest. If an alpha is too high, it may suggest unnecessary duplication of content (Tavakol & Dennick, 2011); and therefore, the items in this scale were screened for redundancy. To this end, it was determined that although the scale may be testing similar

questions, each item has a different guise and the complete scale should be retained for analysis. Furthermore, this scale was adapted from an established measure of perceived success and the potential benefit of removing redundancy was deemed to be not worth the risk of diminishing the scale's coverage.

The final reliability analysis technique involved calculating test-retest reliability for the repeated measures that appeared on both the pre- and posttest. Specifically, the test-retest reliability index was determined by correlating participants' pre- and posttest scores for each variable. Although students in the experimental group were expected to improve their perceptions of relatedness and self-efficacy for relatedness development, it was anticipated that, when analyzed as a whole, the overall sample would exhibit a fairly consistent array of scores over time. The results confirmed that the variables were largely stable over the two measurement times with strong positive correlations between participants' pre- and posttest scores. In general, the test-retest reliabilities exceeded Salkind's (2014) recommended benchmark of .70. The only exceptions were competence, perceived success for program achievement, and perceived success for technology use. These exceptions may be attributed to confounding experiences involving participants' skill development during the semester in which the study was conducted. Nevertheless, all of the correlations exceed .51 in magnitude and were significant at the .001 level.

Validity. The legitimation of this study addressed concerns regarding content validity as well as internal and external validity. First, content validity, or theoretical precision of the measures, was achieved by using established scales that have been empirically substantiated in terms of completeness and accuracy of coverage. The independently developed SERD scale was evaluated for content validity following

psychometric analysis of the instrument. As a result, two items were dropped in order to improve the content validity and psychometric properties of the scale. A more detailed discussion of this procedure was presented early in this chapter. Second, concerns regarding internal validity, or plausible causality, were addressed by implementing experimental and control groups, randomly assigning participants to groups, and using pre- and posttest measures to test any observed effects. Third, concerns regarding external validity, or generalizability, were addressed by implementing the intervention in a common interface that students at many institutions have already encountered, thereby improving the likelihood that the result of this study are generalizable to other similar settings.

Trustworthiness. In addition to the legitimation procedures used to ensure quantitative reliability and validity, this study also established a standard of trustworthiness for qualitative data collection and analysis. To this end, the researcher implemented objective analysis techniques (Bogdan & Biklen, 2007), member checks (Lincoln & Guba, 1985), and external peer review sessions (Creswell & Miller, 2000). First, the researcher promoted objectivity by analyzing the original comments typed by participants; thereby eliminating any interpretation bias that could have been introduced had the data needed to be transcribed by hand (MacLean, Meyer, & Estable, 2004). Furthermore, after extracting the data from the online survey, participants' responses were separated from their names for analysis. It should also be noted that the qualitative analysis was completed prior to the computation of the quantitative results.

In addition to the objective analysis techniques described above, member checks were performed by emailing participants and asking them to indicate whether or not the

researcher's interpretation of the data truly represented their perceptions. In total, 35 of the 41 students in the experimental group responded to the member checking request (85.4%). Of these 35 students, 33 reported that the findings accurately reflected their views. The remaining two students asked follow up questions regarding the coding procedure. After their questions were answered, they too approved the findings as presented.

The third qualitative legitimation technique involved rigorous peer review of the data that were selected as in vivo labels during open coding. The peer review panel consisted of three doctoral students trained in qualitative data analysis. None of the reviewers were affiliated with the project. Working independently, each reviewers was tasked with classifying an identical set of 53 codes drawn from the original data. Reviewers were also instructed to assign each code a positive or negative valence based on if they believed it described elements of relatedness satisfaction or thwarting. Inter-rater reliability (IRR) calculations revealed that the reviewers largely agreed with the principal investigator's classifications. Presented in descending magnitude, Reviewer 1 agreement was 96%, Reviewer 2 was 92%, and Reviewers 3 was 87%. On average, the IRR scores surpassed the 90% criterion suggested by Salkind (2014). When two or more reviewers classified a quotation differently than the principal investigator, the data were reexamined, and when necessary, the associated codes were revised. Collectively, the use of objective analysis techniques, member checks, and external peer review sessions provided a measure of confidence that the qualitative findings were sufficiently credible and trustworthy.

Table 12. Data Analyses Used to Address the Research Questions.

Research Question	Groups Tested	Data Source	Variables		Analysis
			Independent	Dependent	
1. Do the bivariate linear relationships posited by SDT manifest within the synchronous hybrid learning environment?	All Cases	Pretest and Posttest	Participant demographics, program experience variables, basic needs, motivation, perceived success		Pearson correlations
2. Do online and on-campus students have different pretest scores on any of the study variables?	OL vs. OC	Pretest	Group membership: OL or OC	Desire to connect, basic needs, SERD, tech failures, extraversion, motivation, perceived success, GPA	Indep. samples *t*-tests
3. Do online and on-campus students have different posttest scores on any of the study variables?	OL vs. OC	Posttest	Group membership: OL or OC	Basic needs, SERD, tech failures, extraversion, motivation, perceived success	Indep. samples *t*-tests
4. Do relatedness and SERD scores differ between the pretest and the manipulation check for students in the experimental group?	Experimental	Pretest and Manipulation check	Passage of time punctuated by participation in the discussion activity	Relatedness, SERD	Paired samples *t*-tests
5. Do relatedness and SERD scores differ between the pretest and the posttest for students in the experimental group?	Experimental	Pretest and Posttest	Passage of time punctuated by participation in the discussion activity	Relatedness, SERD	Paired samples *t*-tests
6. Do relatedness and SERD scores differ between the pretest and the posttest for students in the control group?	Control	Pretest and Posttest	Passage of time punctuated by nonparticipation in the discussion activity	Relatedness, SERD	Paired samples *t*-tests
7. What themes emerge regarding the qualitative statements made by students who participated in the asynchronous online discussion intervention?	Experimental	Manipulation check (open-ended questions)	N/A	N/A	Qualitative thematic analysis

Main Analyses

Upon completion of the legitimation phase, specific analyses were conducted to address the research questions. Table 12 identifies the relevant participant groups, data sources, and variables used during data analysis. The remainder of this section provides additional commentary on the analytical techniques performed to address each question. The results of the analyses are presented in Chapter IV.

Question 1. The first research question considered the tenability of SDT in synchronous hybrid learning environments in terms of the bivariate linear relationships among the study variables. As such, Pearson correlations were calculated to measure the magnitude and direction of the bivariate linear relationships posited by SDT. Additional correlations were calculated to explore the degree of association between relatedness and select variables that potentially affect relatedness development. These analyses were performed using pre- and posttest data from online and on-campus students in both the experimental and control conditions.

Question 2. The second research question sought to determine if pretest scores differed significantly between online and on-campus students on any of the study variables. To this end, independent samples *t*-tests were used to compare online and on-campus students' pretest mean scores. For these analyses, no distinction was made regarding students' membership in either the experimental or control group.

Question 3. The third research question paralleled the second per the exception that it aimed to determine if posttest scores differed significantly between online and on-campus students on any of the study variables. Accordingly, independent samples *t*-tests were used to compare online and on-campus students' posttest mean scores. These

analyses also did not require the data to be filtered based on students' membership in either the experimental or control group.

Question 4. The fourth research question examined whether or not the intervention was effective in improving relatedness and SERD scores for students in the experimental group directly following their participation in the online discussion activity. To this end, paired samples *t*-tests were used to compare relatedness and SERD scores between the pretest and manipulation check for students in the experimental group. Students in the control group did not participate in the intervention, and therefore were excluded for these analyses. In order to ensure that these analyses were conducted with the largest sample available, no distinction was made between online and on-campus group membership. This consideration also applied to the fifth and sixth research question.

Question 5. The fifth research question expanded upon the fourth in that it sought to determine if the intervention was effective in improving relatedness and SERD scores; however, these analyses specifically examined the long-term effects by comparing pre- and posttest means for students in the experimental group. As such, the previous research question evaluated the immediate outcomes of the intervention, while this mean comparison addressed the permanency of the effects. To address this research question, paired samples *t*-tests were conducted to compare relatedness and SERD scores between the pretest and the posttest for students in the experimental group. As noted above, these analyses did not involving comparing online or on-campus students.

Question 6. The sixth research question, like the fifth, examined pretest-posttest mean differences for relatedness and SERD scores, with the exception being that

comparisons were conducted with students in the control group. Performing these analyses with both the experimental and control groups provided an important point of comparison by which to assess the effectiveness of the intervention. To this end, paired samples *t*-tests were performed to compare relatedness and SERD scores between the pretest and the posttest for students in the control group. Similar to the two previous analyses, this research question did not involving comparing online or on-campus students.

Question 7. The seventh research question aimed to synthesize the qualitative statements students made regarding their experiences in the asynchronous online discussion intervention. Thematic analysis was used to identify regularities and patterns in the students' comments (Bogdan & Biklen, 2007). In particular, a constant comparative approach (Glaser & Strauss, 1967) was used to identify the salient codes, categories, and themes that emerged from the data. This analysis was performed using the textual data that was generated from students' responses to the open-ended questions on the exit-survey manipulation check.

Summary

This chapter described the methodology that was used to examine the effects of an asynchronous online discussion intervention implemented in synchronous hybrid programs. This study extended the work of the researcher's previous two investigations in this area by testing whether or not synchronous hybrid students could improve their perceptions of relatedness or self-efficacy for relatedness development by participating in an asynchronous online discussion intervention. Participants for this study were recruited from a sampling frame of students enrolled in the synchronous hybrid MBA, MPA, or

MS-Avit programs offered at a large U.S. research university. Specific research questions were investigated using a pretest-posttest experimental design. That is, the asynchronous online discussion intervention occurred sequentially in the middle of the two quantitative data collections. The factorial experimental design was executed by randomly assigning participants to either the experimental group, wherein they participated in the asynchronous online discussion intervention, or the control group, wherein they attended classes as normal without any auxiliary interactions.

The study variables were measured using a survey instrument that was largely comprised of a collection of previously validated multi-item scales. Textual data was also generated from students' responses to open-ended questions on the manipulation check that followed the intervention. Accordingly, this study used a convergent parallel mixed methods approach to collect differing, yet complementary, data on students' perceptions of relatedness in synchronous hybrid learning environments. The legitimation of the study addressed concerns regarding reliability, validity, and trustworthiness. Data analysis involved various techniques performed to address the research questions. The next chapter presents the results that were obtained using the methods specified for this study.

CHAPTER IV

RESULTS

The purpose of this study was to examine the effects of an asynchronous online discussion intervention on synchronous hybrid students' perceptions of relatedness and self-efficacy for relatedness development. Ryan and Deci's (2000) self-determination theory (SDT) was adopted as the theoretical framework for this study as it explicitly addresses the role of relatedness in achievement settings. The study purpose was operationalized by administering a pre- and posttest to 83 synchronous hybrid students, with a randomly selected subset (n = 41) completing an online discussion intervention in the middle of the two measurement times. Data analysis involved a battery of statistical tests performed using quantitative survey data as well as a thematic synthesis of participants' responses to open-ended survey items. A convergent parallel mixed methods design was utilized to produce triangulated results based on the multiple data sources (QUAN + qual = triangulation; Creswell & Plano Clark, 2011). Mixing of results was suppressed to the final interpretation of the findings presented in the next chapter. As such, the numeric and text data were first analyzed separately to address the seven research questions listed below.

1. Do the bivariate linear relationships posited by SDT manifest within the synchronous hybrid learning environment?
2. Do online and on-campus students have different pretest scores on any of the study variables?

3. Do online and on-campus students have different posttest scores on any of the study variables?
4. Do relatedness and SERD scores differ between the pretest and the manipulation check for students in the experimental group?
5. Do relatedness and SERD scores differ between the pretest and the posttest for students in the experimental group?
6. Do relatedness and SERD scores differ between the pretest and the posttest for students in the control group?
7. What themes emerge regarding the qualitative statements made by students who participated in the asynchronous online discussion intervention?

This chapter reports the findings for each of the research questions noted above. The results from the data legitimation procedures along with descriptive characteristics of the data were presented in Chapter III. A merged interpretation of the quantitative and qualitative stands follows in Chapter V. The present chapter concludes with a brief discussion of the statistically nonsignificant results.

Research Questions

Question 1: Do the bivariate linear relationships posited by SDT manifest within the synchronous hybrid learning environment?

The first research question was addressed by conducting Pearson correlations to measure the magnitude and direction of the bivariate linear relationships among the study variables. These analyses were conducted using pre- and posttest data from online and on-campus students. The results are presented in two parts. First, the observed correlations are discussed with respect to the SDT framework. Second, commentary is

provided regarding the degree of association between relatedness and select variables that potentially affect relatedness development.

Correlations among SDT constructs. In support of Ryan and Deci's (2000) SDT, the majority of the bivariate correlations calculated among the SDT constructs were significant for both online and on-campus students. For the most part, these findings were consistent across the pretest (see Table 13) and the posttest (see Table 14). In terms of the basic needs, significant large positive intercorrelations were found among autonomy, competence, and relatedness. The results also indicated that nearly all of the dimensions of need satisfaction were significantly correlated with intrinsic motivation in a positive direction and with amotivation in a negative direction. Fewer significant bivariate relationships were observed between autonomy, competence, and relatedness with the motivation types found in the interior of the SDT spectrum (identified, introjected, extrinsic). In particular, it should be noted that online and on-campus students' extrinsic motivation scores were not significantly correlated with any of the basic needs on the pretest or the posttest. The basic needs scales, however, were found to have significant large positive bivariate relationships with perceived success for program achievement and technology use.

In terms of the types of motivation, the results indicated that perceived success for program achievement and technology use each had a significant large positive relationship with intrinsic motivation and a significant large negative relationship with amotivation. Large positive correlations were also found among almost all of the independent parings between intrinsic motivation, identified regulation, introjected regulation, and extrinsic motivation. As anticipated, amotivation was found to be

negatively correlated with the other four types of motivation. In general, all of the relationships reported above were observed for both the online and the on-campus students. The magnitude and direction of these relationships also aligned with the results obtained during pilot testing. Taken together, these correlations provided strong support for the tenability of SDT in synchronous hybrid learning environments.

Correlations among relatedness constructs. In addition to testing the bivariate linear relationships posited by SDT, this analysis also examined the degree of association between relatedness and select variables that potentially affect relatedness development in synchronous hybrid learning environments (see Table 15). The results indicated that the occurrence of technology failure events was negatively correlated with students' perceptions of relatedness. These correlations, however, were only significant for the online group. Furthermore, large positive relationships were found between extraversion and relatedness for both online and on-campus students. In terms of students' desire to connect with classmates, the data showed that the only significant bivariate relationships that existed were split by delivery mode. That is, for the on-campus group, relatedness was positively correlated with desire to connect with on-campus students, and for the online group, relatedness was positively correlated with desire to connect with online students.

Similar to the results regarding students' desire to connect, no significant relationship was found between relatedness for on-campus students and SERD-OL. In contrast, there was a large positive relationship between SERD-OC and relatedness for on-campus students. This correlation, however, was only observed on the pretest.

Table 13. Intercorrelations Among the SDT Constructs as Measured on the Pretest.

Variable	1	2	3	4	5	6	7	8	9	10
1. Auton	—	.44**	.57**	.53**	.29*	.16	-.01	-.41**	.48**	.40**
2. Compt	.55**	—	.54**	.16	.11	-.10	.10	-.49**	.45**	.56**
3. Relate	.61**	.61**	—	.26*	.20	.17	-.01	-.35**	.43**	.49**
4. Intrin	.74**	.61**	.53**	—	.49**	.35**	.02	-.28*	.63**	.35**
5. Ident	.52**	.42*	.57**	.51**	—	.52**	.59**	-.19	.47**	.22
6. Introj	.44*	.47*	.25	.54**	.21	—	.48**	.12	.27*	.14
7. Extrin	.15	.31	.30	.09	.44*	.29	—	-.12	.17	.09
8. Amot	-.66**	-.58**	-.47*	-.69**	-.64**	-.31	-.23	—	-.26*	-.24
9. PSucc-Prog	.47*	.81**	.54**	.58**	.45*	.47*	.52**	-.65**	—	.41**
10. PSucc-Tech	.47*	.75**	.55**	.50*	.36	.44*	.32	-.43*	.83**	—

Note. The on-campus group (n = 26) correlation matrix is along the lower diagonal while the matrix for the online group (n = 57) is along the upper diagonal.
* $p < .05$, ** $p < .01$ (two-tailed).

Table 14. Intercorrelations Among the SDT Constructs as Measured on the Posttest.

Variable	1	2	3	4	5	6	7	8	9	10
1. Auton	—	.61**	.64**	.67**	.28*	.31*	-.08	-.44**	.58**	.48**
2. Compt	.51**	—	.58**	.47**	.35**	.14	.04	-.55**	.73**	.64**
3. Relate	.71**	.63**	—	.53**	.25	.28*	-.09	-.43**	.46**	.68**
4. Intrin	.73**	.56**	.59**	—	.34**	.45**	-.04	-.36**	.45**	.45**
5. Ident	.53**	.40*	.51**	.69**	—	.15	.59**	-.39**	.36**	.41**
6. Introj	.50**	.59**	.29	.58**	.46*	—	.19	-.02	.24	.17
7. Extrin	.36	.36	.30	.37	.69**	.57**	—	-.11	.14	.07
8. Amot	-.41*	-.28	-.38	-.66**	-.69**	-.28	-.24	—	-.49**	-.43**
9. PSucc-Prog	.51**	.75**	.59**	.64**	.65**	.67**	.47*	-.51**	—	.60**
10. PSucc-Tech	.59**	.63**	.56**	.50**	.49*	.58**	.35	-.26*	.80**	—

Note. The on-campus group (n = 26) correlation matrix is along the lower diagonal while the matrix for the online group (n = 57) is along the upper diagonal.
* $p < .05$, ** $p < .01$ (two-tailed).

In contrast to the on-campus group, significant large positive correlations were found among relatedness, SERD-OL, and SERD-OC for online students. Although the results reported above suggest that differences may exist between online and on-campus students, bivariate relationships alone are insufficient to fully juxtapose the two groups. The next research question sought to further examine the differences and similarities between these groups by comparing online and on-campus students' pretest mean scores.

Table 15. Intercorrelations Among Relatedness and Potential Factors Affecting Relatedness Development.

	Relatedness			
	On-campus (n = 26)		Online (n = 57)	
Variable	Pretest	Posttest	Pretest	Posttest
Tech failure events	-.36	.01	-.24*	-.41**
Extraversion	.28*	.45*	.33*	.30*
Desire connect with OL	.40*	.36	.32*	.30*
Desire connect with OC	.63**	.53**	.25	.25
SERD-OL	.36	.28	.47**	.69**
SERD-OC	.49*	.27	.34*	.52**

Note. * $p < .05$, ** $p < .01$ (two-tailed).

Question 2: Do online and on-campus students have different pretest scores on any of the study variables?

Independent samples *t*-tests were performed to determine if pretest scores differed significantly between online and on-campus students on any of the study variables (see Table 16). In general, the results indicated that online and on-campus students had comparable mean scores on many of the measured constructs. The following discussion provides a full account of the significant and nonsignificant results involving the control variables, SDT constructs, SERD scales, and success measures.

Table 16. Group Differences Between On-Campus and Online Students on Pretest Scores.

	On-campus		Online					
Dependent Variable	*M*	*SD*	*M*	*SD*	Mean Difference	*t*	*df*	*p*
Tech failure events	4.85	2.41	4.60	2.23	0.25	0.46	81	.646
Extraversion	3.39	0.91	3.14	0.77	0.25	1.34	81	.186
Desire connect with OL[a]	2.64	1.38	3.39	1.03	-0.75	-2.42	36.24	.021
Desire connect with OC	4.04	0.96	3.20	1.18	0.84	3.17	79	.002
Autonomy	5.17	1.05	4.70	0.98	0.47	2.00	81	.048
Competence	5.69	0.98	5.62	1.00	0.07	0.30	81	.762
Relatedness	5.38	0.98	4.87	0.87	0.51	2.42	81	.018
Intrinsic	5.59	1.29	5.23	1.37	0.36	1.11	81	.269
Identified	5.54	0.85	5.27	1.23	0.27	1.00	81	.322
Introjected	4.26	1.68	4.12	1.70	0.14	0.34	81	.734
Extrinsic	5.08	1.32	4.88	1.40	0.20	0.61	81	.541
Amotivation[a]	1.55	0.82	1.92	1.36	-0.37	-1.55	74.43	.126
SERD-OL[a]	2.72	1.13	3.26	0.87	-0.54	-2.15	38.94	.037
SERD-OC	3.73	1.00	2.94	1.08	0.79	3.14	78	.002
Perceived Success-Prog	5.55	1.22	5.37	0.98	0.18	0.74	81	.461
Perceived Success-Tech[a]	5.38	1.34	5.83	0.99	-0.45	-1.52	36.25	.138
GPA	3.78	0.50	3.57	0.66	0.21	1.12	53	.267

Note. $N = 83$ participants (26 on-campus, 57 online). Degrees of freedom may vary because incomplete responses were addressed using pairwise deletion. Extraversion, desire to connect, and SERD had a possible range of 1 (low) to 5 (high). Basic needs, motivation, and perceived success had a possible range of 1 (low) to 7 (high). Tech failure events were measured on a scale from 1 (low) to 10 (high).

[a] $p < .05$ for Levene's test for homogeneity of variances.

[b] GPA mean scores were calculated using the following subsets of students who gave special consent to share their GPA data: Overall ($n = 55$); On-campus ($n = 16$); Online ($n = 39$).

Control variables. This set of analyses examined three control variables: technology failure events, extraversion, and participants' desire for peer connections. These comparisons showed that online and on-campus students did not differ in terms of their self-reports of technology failure or their preferences for an extraverted social interaction style. The results also showed that students expressed a greater desire to connect with peers in the same attendance mode than they did with students in the opposite attendance mode.

SDT constructs. The first set of comparisons involving the basic needs variables showed that no significant differences existed between online and on-campus students in terms of competence. Autonomy scores, however, were significantly higher for the on-campus group. In regard to the purpose of the current study, the most noteworthy difference was that on-campus students reported higher levels of relatedness than their online counterparts. This finding has been consistently observed at each time point in this program of research, including the pilot tests; thereby further justifying the need for this study. No significant differences were found between online and on-campus students regarding the types of motivation identified on the SDT continuum.

Self-efficacy for relatedness development. Commensurate with the findings of the previous mixed methods study, the results indicated that students reported significantly higher levels of self-efficacy for developing relatedness with classmates in their same attendance mode than they did concerning the opposite attendance mode. That is, online students felt more capable of forming relationships with other online students than the alternative modality—on-campus students. Likewise, on-campus students felt

more capable of forming relationships with other on-campus students than they did with online students.

Success measures. Student success was measured using self-reports as well as GPA data obtained from institutional records. The self-report scales assessed perceived success in the program and in using technology. The results indicated that online and on-campus students did not differ in terms of the self-report measures or GPA. The next research question further analyzed the differences and similarities between the online and on-campus groups using students' posttest scores.

Question 3: Do online and on-campus students have different posttest scores on any of the study variables?

The third research question was analyzed using independent samples *t*-tests to determine if posttest scores differed significantly between online and on-campus students on any of the study variables (see Table 17). As an extension of the previous research question, which contrasted attendance modes at the beginning of the term, the second research question used posttest data to examine group differences at the end of the term. As such, this analysis provided insight as to whether or not the differences observed on the pretest endured over the course of the study. The commentary below addresses the significant and nonsignificant differences involving the control variables, SDT constructs, SERD scales, and success measures.

Table 17. Group Differences Between On-Campus and Online Students on Posttest Scores.

	On-campus		Online					
Dependent Variable	*M*	*SD*	*M*	*SD*	Mean Difference	*t*	*df*	*p*
Tech failure events	5.35	2.50	4.74	2.26	0.61	1.10	81	.274
Extraversion	3.46	0.87	3.25	0.81	0.21	1.05	81	.299
Autonomy	5.09	0.93	4.56	1.07	0.53	2.16	81	.034
Competence	5.80	0.89	5.50	1.06	0.30	1.24	81	.217
Relatedness	5.27	0.98	4.87	0.93	0.40	1.80	81	.076
Intrinsic	5.55	1.30	5.13	1.33	0.42	1.35	81	.181
Identified	5.54	1.14	5.39	1.11	0.15	0.54	81	.588
Introjected	4.55	1.32	4.14	1.60	0.41	1.15	81	.254
Extrinsic	5.11	1.19	5.04	1.24	0.07	0.24	81	.808
Amotivation	1.71	1.26	1.87	1.13	-0.16	-0.57	81	.573
SERD-OL	2.90	0.97	3.38	0.95	-0.48	-2.12	81	.037
SERD-OC	3.64	0.98	2.81	1.15	0.83	3.18	80	.002
Perceived Success-Prog	5.68	1.03	5.35	1.06	0.33	1.32	81	.190
Perceived Success-Tech	5.67	1.13	5.89	1.10	-0.22	-0.85	81	.399

Note. $N = 83$ participants (26 on-campus, 57 online). Degrees of freedom may vary because incomplete responses were addressed using pairwise deletion. Extraversion and SERD had a possible range of 1 (low) to 5 (high). Basic needs, motivation, and perceived success had a possible range of 1 (low) to 7 (high). Tech failure events were measured on a scale from 1 (low) to 10 (high).

Control variables. Similar to the comparisons conducted with the pretest data, the results indicated that online and on-campus students did not differ in terms of their self-reports of technology failure or their preferences for an extraverted social interaction style. No additional data were collected on the posttest regarding participants' desire for peer connections. Instead, this study focused on participants' scores on the self-efficacy for relatedness development scales, which are presented below following the comparisons of the SDT constructs.

SDT constructs. Posttest comparisons of students' autonomy and competence scores mirrored the results observed on the pretest. Namely, on-campus students continued to report greater levels of autonomy than their peers online, and the difference between online and on-campus students' competence scores remained nonsignificant. A particularly intriguing finding, however, was that the posttest data showed no significant differences between online and on-campus students in terms of relatedness. This is worthy of emphasis as it marks the first time since the inception of this program of research that online and on-campus students did not differ on this dimension of need satisfaction, suggesting that the intervention may have helped to mitigate previously observed differences in relatedness. Additional commentary on the effectiveness of the intervention is provided in the following sections. Lastly, mean scores on the types of motivation did not differ significantly between online and on-campus students.

Self-efficacy for relatedness development. As was seen on the pretest, posttest comparisons showed that both online and on-campus students continued to report significantly higher levels of self-efficacy for developing relatedness with classmates in their same attendance mode, versus with peers who attend using the opposite modality.

While the results mirrored those of the pretest, the observed differences involving students' posttest scores were particularly noteworthy in that the latter of the two measurement times occurred at the end of the term. That is, by the time the posttest was administered, students would have encountered several opportunities to interact with peers in the opposite delivery mode, either as part of their normal class experiences or as part of the intervention activity. In general, it would appear that this finding indicated a departure from the intended outcome of the intervention; however, the analyses performed to address the remaining research questions suggested that the intervention did have a positive effect on students' self-efficacy for developing relatedness with individuals in the online attendance mode. These results are presented in detail later in this chapter.

Success measures. The posttest data showed that online and on-campus students did not differ in terms of their perceived success in the program or in using the technology. Given that this study was conducted in one semester, students' GPA did not change between the pre- and posttest. Therefore, this comparison was not repeated for this set of analyses. The next research question specifically focused on quantitatively examining the effects of the intervention directly following students' participation in the online discussion activity.

Question 4: Do relatedness and SERD scores differ between the pretest and the manipulation check for students in the experimental group?

As the first empirical examination of this relatedness development intervention, this comparison was necessary to determine if the online discussion activity was a successful manipulation, as indicated by a change in students' relatedness and SERD scores form their pretest levels. To this end, paired samples *t*-tests were performed to

compare relatedness and SERD scores between the pretest and the manipulation check for students in the experimental group (see Table 18). The results revealed that the manipulation was successful in that SERD-OL scores directly following the intervention were significantly higher than those observed on the pretest. However, the data showed that there was no significant change in students' relatedness and SERD-OC scores between the pretest and the manipulation check. Although it was anticipated that higher means would have been observed for these variables following the intervention, the findings did indicate that students improved their SERD-OL scores, at least in the immediate term. The next research question examined the long-term effects of the intervention, with particular attention to the pre- and posttest mean differences observed for students in the experimental group.

Table 18. Paired Samples *t*-tests Between Pretest and Manipulation Check Scores for Students in the Experimental Group.

Dependent Variable	Pretest		MC		Mean Difference	*t*	*df*	*p*
	M	*SD*	*M*	*SD*				
Relatedness	5.05	0.94	4.96	0.95	-0.09	-0.41	40	.681
SERD-OL	3.04	1.07	3.50	0.87	0.46	4.25	40	.000***
SERD-OC	3.15	1.18	2.95	1.16	-0.20	-1.51	39	.139

Note. $n = 41$ participants (12 on-campus, 29 online). Degrees of freedom may vary because incomplete responses were addressed using pairwise deletion. The SERD scale had a possible range of 1 (low) to 5 (high). Relatedness had a possible range of 1 (low) to 7 (high).
***$p < .001$ (two-tailed).

Question 5: Do relatedness and SERD scores differ between the pretest and the posttest for students in the experimental group?

The fifth research question sought to assess the effectiveness of the intervention by determining whether or not the results of the previous mean comparisons involving students' pretest and manipulation check scores were perpetuated between the pretest and

the posttest. Accordingly, this analysis explored the potential long-term effects of the intervention, while the previous mean comparisons only considered the effectiveness of the intervention in the immediate term. To address this research question, paired samples *t*-tests were conducted to compare relatedness and SERD scores between the pretest and the posttest for students in the experimental group.

The results were similar to the comparisons conducted with the pretest and manipulation check data (see Table 19). In particular, the results revealed that students' relatedness and SERD-OC scores did not differ significantly between the pretest and the posttest. However, despite this departure from the intended outcomes of the intervention, the data showed that students' SERD-OL scores were significantly higher on the posttest than on the pretest. The perpetuation of this finding indicated that students in the experimental group not only improved their SERD-OL scores from the pretest to the manipulation check, but also maintained this increased mean through the end of the semester when the posttest was administered. It should be noted, however, that both those who participated in the intervention and those who did not would have had opportunities to develop relationships through the typical classroom interactions that occur throughout the semester. The next research question examined the pre- and posttest mean differences for students in the control group, thereby contributing an important point of comparison by which to demine if the increase in SERD-OL scores observed in this analysis was unique to the experimental group.

Table 19. Paired Samples *t*-tests Between Pretest and Posttest Scores for Students in the Experimental Group.

Dependent Variable	Pretest		Posttest		Mean Difference	*t*	*df*	*p*
	M	*SD*	*M*	*SD*				
Relatedness	5.05	0.94	5.04	0.98	-0.01	-0.04	40	.971
SERD-OL	3.04	1.07	3.28	1.04	0.24	2.07	40	.045
SERD-OC	3.15	1.18	2.99	1.26	-0.16	-1.27	39	.211

Note. $n = 41$ participants (12 on-campus, 29 online). Degrees of freedom may vary because incomplete responses were addressed using pairwise deletion. The SERD scale had a possible range of 1 (low) to 5 (high). Relatedness had a possible range of 1 (low) to 7 (high).

Question 6: Do relatedness and SERD scores differ between the pretest and the posttest for students in the control group?

The final quantitative research question considered pretest-posttest mean differences for the control group—an important point of comparison for assessing the effectiveness of the intervention for the experimental group. In particular, juxtaposing the results of pretest-posttest mean comparisons for both the treatment and control conditions was necessary in order to demonstrate that the increase in SERD-OL scores observed for the experimental group was not due to the typical classroom interactions that occur throughout the semester. As such, these analyses involved conducing paired samples *t*-tests to assess the mean differences between pre- and posttest relatedness and SERD scores for students in the control group.

The results indicated that students in the control group did not differ significantly between the pretest and the posttest on relatedness, SERD-OC, or SERD-OL (see Table 20). This finding is intriguing given that students in the experimental group did improve their SERD-OL scores between the pretest and the posttest. To this end, it is important to note that independent samples *t*-tests performed during group formation confirmed that students in the experimental and control conditions did not have

statistically different SERD-OL scores prior to the intervention, $t(81) = .49$, $p = .625$, nor did they differ on any of the other study variables ($p > .200$). Furthermore, the observed increase in SERD-OL scores applied to both on-campus and online students in the experimental condition, suggesting that the intervention accomplished the goal of providing students with a common virtual space wherein they could connect with peers who attend classes using the opposite delivery format.

In sum, the results indicated that the intervention promoted self-efficacy for developing relatedness with online peers in a way that surpassed the typical classroom interactions experienced by the control group. In terms of completeness of this conclusion, however, it is also necessary to consider the qualitative statements made by students who participated in the asynchronous online discussion intervention. The next research question sought to uncover key themes regarding relatedness development by performing a constant comparative analysis of participants' responses to open-ended, qualitative survey items.

Table 20. Paired Samples *t*-tests Between Pretest and Posttest Scores for Students in the Control Group.

Dependent Variable	Pretest		Posttest		Mean Difference	*t*	*df*	*p*
	M	*SD*	*M*	*SD*				
Relatedness	5.01	0.93	4.95	0.95	-0.06	-0.64	41	.524
SERD-OL	3.14	0.90	3.18	0.91	0.04	0.51	41	.611
SERD-OC	3.24	1.06	3.18	1.08	-0.06	-0.50	39	.621

Note. $n = 42$ participants (14 on-campus, 28 online). Degrees of freedom may vary because incomplete responses were addressed using pairwise deletion. The SERD scale had a possible range of 1 (low) to 5 (high). Relatedness had a possible range of 1 (low) to 7 (high).

Question 7: What themes emerge regarding the qualitative statements made by students who participated in the asynchronous online discussion intervention?

The first six, quantitative, research questions examined bivariate relationships posited by SDT, group differences based on attendance mode, and the effects of the online discussion intervention. The seventh, qualitative, research question provided additional insight on the effectiveness of the intervention and helped discern what the experience was like for the participants in the experimental group. The data for this research question were comprised of students' responses to three open-ended survey items found on the manipulation check that followed the intervention. Thematic analysis was used to identify regularities and patterns in the students' comments (Bogdan & Biklen, 2007). The remainder of this section provides additional commentary on data management procedures, students' binary responses, coding techniques, and the emergent codes, categories, and themes.

Data management procedures. After all of the students in the experimental condition completed the exit-survey manipulation check, the researcher closed the online survey and extracted the data from the Qualtrics™ server. Initially students' responses to the open-ended items were stored in string variables within the SPSS data file. The original comments were downloaded into a word processor, wherein the researcher proceeded to reorganize the data into three transcripts. The first transcript combined all of the students' comments into one composite file of approximately 10,000 words. The comments made by online and on-campus students were then dichotomized and saved as separate transcripts. The three transcripts were formatted so that all of the responses to a given question appeared together. This reorganization was necessary to aggregate students' binary (yes/no) responses for each open-ended question.

Binary responses. In addition to the thematic coding described below, it should not be overlooked that many students provided direct, binary (yes/no; positive/negative) responses to the following three open-ended questions:

1. Please describe your experience participating in the online discussion activity. Do you feel that the activity was effective for developing relationships with peers in your program who attend using the opposite delivery format? Why or why not? Please be specific.
2. Based on your experience in the online discussion activity, will you change your actions in terms of seeking relationships with classmates in your program? Please be specific.
3. Do you anticipate continuing to build a relationship with the individuals whom you connected with during the online discussion activity? Why or why not?

As suggested in the question stems, most participants provided additional details, relevant examples, or other evidence to support their comments. As such, thematic analysis was necessary to grasp the richness of the data; however, it is also important to consider students' underlying binary response patterns. The results from this analysis are reported in Table 21.

Table 21. Binary Responses to Open-Ended Survey Questions.

Abbreviated Open-ended Question	Binary Responses	Overall $n = 41$		On-campus Students $n = 12$		Online Students $n = 29$	
		Valid *n*	Valid *%*	Valid *n*	Valid *%*	Valid *n*	Valid *%*
1. Was the activity effective for developing relationships with peers who attend using the opposite delivery format?	Yes	23	71.9	9	81.8	14	66.7
	No	9	28.1	2	18.2	7	33.3
	Missing	9	-	1	-	8	-
2. Will you change your actions in terms of seeking relationships with classmates in your program?	Yes	8	25.0	1	12.5	7	29.2
	No	24	75.0	7	87.5	17	70.8
	Missing	9	-	4	-	5	-
3. Do you anticipate continuing to build a relationship with the individuals whom you connected during the activity?	Yes	13	37.1	3	30.0	10	40.0
	No	22	62.9	7	70.0	15	60.0
	Missing	6	-	2	-	4	-

Note. All students in the experimental group responded to each of the open-end questions. The missing values indicate instances in which students' comments were too complex to be distilled to a binary (yes/no) response.

Student responses to the first question provided strong support for the effectiveness of the intervention. In particular, the frequencies indicated that the majority of both online and on-campus students thought that the activity was effective for developing relationships with peers who attended class using the delivery format that differed from their own. This is noteworthy given that the original goal of the intervention was to provide students with a common virtual space wherein they could connect with peers in the opposite modality.

In contrast to this favorable outcome, frequencies for the second question indicated that most students did not plan to change their actions in terms of seeking relationships with their classmates. This result, however, may be attributable to nuances in how students interpreted the question. That is, some students may believe that they are already behaving in a way that fosters relatedness with classmates, and therefore, would

not need to change their actions. Accordingly, a negative binary response from this vantage point can be misleading in terms of evaluating the effectiveness of the intervention.

In response to the third question, most students indicated that they did not anticipate continuing to build relationships with the individuals whom they connected with during the activity. This finding suggests that while the intervention was successful in the short term, it may not provide the scaffolding necessary to support long-term relationships. Although the binary responses provided a snapshot of participants' reactions to the online discussion intervention, the thematic analysis presented below offers a more complete understanding of the qualitative data.

Thematic coding. Prior to aggregating participants' binary responses, the researcher conducted a thematic analysis of the composite transcript. In order to guard against bias, participants' names were replaced with pseudonyms and any identifying information regarding their delivery mode was removed. Using a constant comparative approach (Glaser & Strauss, 1967), the data were coded in two iterations. Both of the iterations were performed using ATLAS.ti (2014), a qualitative data analysis program.

For the first coding iteration, the composite transcript was read objectively without any pre-conceived notion of what might emerge as being salient in the data. During this phase, a total of 386 potentially informative quotations were identified. Using open coding, 160 descriptors (i.e., codes) were derived from the data and assigned to as many quotations as applicable. Most of the codes were in vivo codes,

that is, the code names were comprised of the exact words used by the study participants (Roulston, 2010). In instances when in vivo codes would have been too ambiguous, more descriptive code names were selected to represent the data.

After the first coding iteration was completed, the researcher carefully reviewed the resulting code list for redundancies. This process revealed that several codes were too narrow in scope to justify a separate data label. These narrow codes were combined with similar codes that encompassed their communicative value, without losing any richness of the data. Through this combing effort, the total number of codes was reduced from 160 to 53. The remaining codes were evaluated and assigned a positive or negative valence based on if they described elements of relatedness satisfaction or thwarting. These categorizations were vetted using the external peer review process as described in the previous chapter. As a final step, the 53 codes were reapplied to the online and on-campus student transcripts to check for possible response patterns associated with participants' delivery mode.

Upon completion of the second coding iteration, the codes were grouped into categories based on observed patterns in the data (Roulston, 2010). Overall the analysis generated nine categories that represent student relatedness development in synchronous hybrid programs: *Student Disposition*, *Perceived Value*, *Relationship Incentives*, *Platform Configuration*, *Technology Influence*, *Mixed-Modality Infrastructure*, *Development Opportunities*, *Individual Differences*, and *Perceived Barriers*. These nine categories were subsequently merged into three key themes: *Student Relatedness Beliefs*, *Program Delivery*, and *Student-Interface Interaction*.

Finally, the following comprehensive assertion (Glesne, 2011) was advanced to capture the essence of the three emergent themes: *Relatedness development in synchronous hybrid courses requires a dynamic mix of nutriments that can be satisfied or thwarted differently for every student*. The link between the final assertion and the language of Van den Broeck et al.'s (2010) need satisfaction/thwarting scale emerged as an unexpected, albeit justifiable, connection to SDT. A summary of the qualitative data analysis is provided in Figure 15. The following sections provide evidence of the emergent perceptions that support the identification and development of each of the key themes.

Student relatedness beliefs. The *Student Relatedness Beliefs* theme was defined by the attitudes and assumptions about relatedness development that influenced students' social behavior. The categories within this theme were *Student Disposition*, *Perceived Value*, and *Relationship Incentives*. As evidenced by the student comments presented below, participants held a wide variety of beliefs regarding relatedness development. In response to the question about students' intentions to seek relationships, Tessa (on-campus student) offered the following explanation for her resistance to peer relationships: "I am not in the program to make friends. Most weeks I barely have enough time to prepare for class, let alone cultivate relationships with other students." Responding to the same question, Aaron (online student) said: "Getting to know students in the program has definitely improved my experience, regardless of how they attend class." Overall, both online and on-campus students made markedly more positive comments than negative ones. A full comparison of positive and negative code frequencies is presented following the description of the themes.

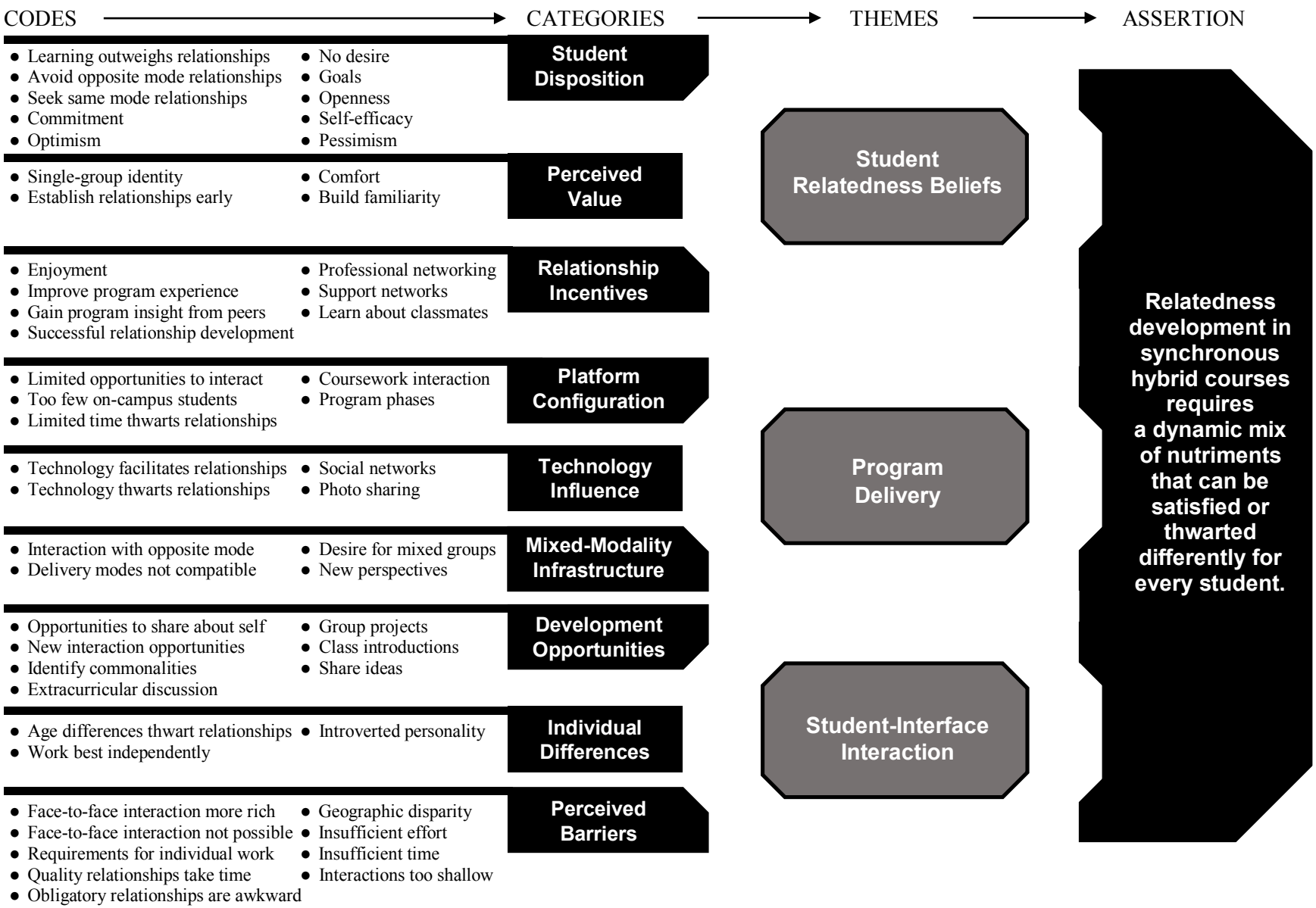


Figure 15. Summary of Qualitative Data Analysis.

Program delivery. The *Program Delivery* theme was defined by students' comments regarding the effects of program delivery on relatedness development. The categories within this theme were *Platform Configuration*, *Technology Influence*, *Mixed-Modality Infrastructure*. Unlike the internally-focused *Student Relatedness Beliefs* theme, the *Program Delivery* theme abstracted the program as an external factor impacting relatedness development. To this end, Elizabeth (on-campus student) described how the program delivery interface makes it difficult to form relationships with students in the opposite attendance mode.

> It is hard to find the opportunity to interact with online students, both in and outside of class. For example, I can't interact with just one online student without interacting with the entire class and the instructor, which I find to be a bit awkward.

Other students, like Anthony (online student), saw the program delivery interface as a nonissue. On this topic he wrote: "I don't think that the online format is preventing me from seeking relationships any more than if I was on-campus." For both online and on-campus students, the total number of positive comments overshadowed those made in a negative context.

Student-interface interaction. The *Student-Interface Interaction* theme was defined by the preconditions for relatedness development based on students' characteristics and their interface with the learning environment. The categories within this theme were *Development Opportunities*, *Individual Differences*, and *Perceived Barriers*. In contrast to the *Program Delivery* theme, which represented the program as an external force, this theme was characterized by statements describing how students

expressed themselves in the learning environment. Accordingly, it was found that students in this study had different preferences for building relationships online. Melanie (on-campus student), reported that she was very comfortable using the synchronous hybrid interface to facilitate relatedness development. "I love the discussion board feature," she explained, "I will definitely use it as a way to connect with people in the future." This perspective was juxtaposed by students such as Desiree (online student), who expressed concerns with student-interface interactions:

> I am not really comfortable giving out information about myself to people that I have just met online. In this program other students can read our posts and see our pictures; however, it takes time for me to feel comfortable opening up. In this highly technological age, privacy seems to be a lost concept, but I think it is important.

In contrast to the positive guise of the previous two themes, the majority of online and on-campus students described student-interface interactions in a negative tone.

Positive and negative code frequencies. In addition to the thematic analysis presented above, ATLAS.ti (2014) was used to calculate frequencies of the positive and negative comments made by the study participants. Table 22 provides a full comparison of positive and negative code frequencies organized by theme and attendance mode. When considered together, it is important to note that online and on-campus students contributed to both the positive and negative comments observed within each theme. Therefore, the results of the code frequency analysis provided strong support for the final assertion: Relatedness development in synchronous hybrid courses requires a dynamic mix of nutriments that can be satisfied or thwarted differently for every student.

Table 22. Group Comparison of Positive and Negative Code Frequencies by Theme.

		Overall $n = 41$		On-campus Students $n = 12$		Online Students $n = 29$	
Theme	Valance	Total Comments	Comments per person	Total Comments	Comments per person	Total Comments	Comments per person
Student Relationship Beliefs	Positive	93	2.27	29	2.42	64	2.21
	Negative	36	0.88	7	0.58	29	1.00
	Total	129	-	36	-	93	-
Program Delivery	Positive	73	1.78	20	1.67	53	1.83
	Negative	45	1.10	17	1.42	28	0.97
	Total	118	-	37	-	81	-
Student-Interface Interaction	Positive	47	1.15	16	1.33	31	1.07
	Negative	92	2.24	26	2.17	66	2.28
	Total	139	-	42	-	97	-
All Themes (Composite)	Positive	213	5.20	65	5.42	148	5.10
	Negative	173	4.22	50	4.17	123	4.24
	Total	386	-	115	-	271	-

Note. Comments per person represents the total comments made divided by the number of participants in the group.

Nonsignificant Results

In addition to the research questions addressed above, a factorial analysis of variance (ANOVA) was performed to explore the effects of attendance mode (online vs. on-campus) and treatment condition (experimental vs. control) on pretest-posttest change scores for relatedness. A 2 x 2 design was used to test for main effects associated with the group membership variables as well as a potential interaction between these factors. In accordance with Maxwell and Howard's (1981) guidelines for randomized experimental designs, change scores for relatedness were used as the dependent variable for this analysis. This outcome variable was calculated by subtracting students' pretest scores from their posttest scores.

The results showed that there were no significant main effects for attendance mode, $F(1, 79) = 0.70$, $p = .404$, or treatment condition, $F(1, 79) = 0.09$, $p = .764$.

Likewise, there was no statistically significant interaction between the factors, $F(1, 79) = 0.05$, $p = .831$. Two additional factorial ANOVAs were conducted using change scores for SERD-OL and SERD-OC as the dependent variables. Again the data indicated no significant main effects or interactions ($p = .133$ to .864).

The effects of treatment condition and time were also analyzed using 2 x 2 pre-post mixed factorial ANOVAs (Campbell & Stanley, 1963). The between-subjects variable was treatment condition (experimental vs. control), and the within-subjects variable was time (pre vs. posttest scores). Separate mixed ANOVAs were conducted to examine pre-post relatedness, SERD-OL, and SERD-OC. These analyses were performed using online and on-campus students as well as a composite of all the cases. For the most part, the data revealed no significant main effects or interactions ($p = .160$ to .980). The composite data of all cases provided the only exception. Specifically, the results showed a significant main effect for time such that SERD-OL scores increased from the pretest to the posttest, $F(1, 81) = 4.01$, $p = .045$. An examination of means indicated that the observed change reflected an increase in scores for the experimental group. This finding, however, was redundant with the mean comparison presented in response to the fifth research question. Consequently, the mixed ANOVAs did not provide any unique insights into the data.

Mediational analyses were also conducted to determine if the types of motivation mediated the effects of autonomy, competence and relatedness on perceived success for program achievement or technology use. A three-step multiple regressions model with 95% bootstrap confidence intervals was used to assess hypothesized mediational relationships (Baron & Kenny, 1986). The empirical data gather in this study revealed

only direct effects among the study variables. The magnitude and direction of these effects are reflected by the bivariate relationships reported in response to Research Question 1. In general, it should be noted that the limited number of participants as well as the uneven group sizes may have constrained the statistical power of the analyses discussed in this section.

Summary

This chapter reported the findings for each of the seven research questions advanced in this study. Analysis of the quantitative research questions involved a battery of statistical tests designed to explore the relationships among the study variables. The results indicated that students who participated in the online discussion improved their self-efficacy for developing relatedness with individuals in the online attendance mode. In addition, the intervention mitigated previously observed differences in relatedness between online and on-campus students.

The qualitative research question was addressed using thematic analysis of students' responses to open-ended survey items. The findings of the qualitative analysis suggested that three themes impact relatedness development in synchronous hybrid learning environments: *Student Relatedness Beliefs*, *Program Delivery*, and *Student-Interface Interaction*. These three themes were summarized into the following comprehensive assertion: Relatedness development in synchronous hybrid courses requires a dynamic mix of nutriments that can be satisfied or thwarted differently for every student. The next chapter expands on the quantitative and qualitative findings by advancing additional interpretations, recommendations, and linkages to the literature.

CHAPTER V

DISCUSSION

The purpose of this study was to examine the effects of an asynchronous online discussion intervention on students' perceptions of relatedness and self-efficacy for relatedness development in synchronous hybrid learning environments. Through a program of research spanning two previous studies, relational deficiencies have emerged as a significant area of concern for synchronous hybrid programs. The current study sought to address this issue by implementing a targeted intervention that provided opportunities of peer interaction beyond the typical classroom experience. Ryan and Deci's (2000) self-determination theory (SDT) was adopted as the theoretical framework for this study as it explicitly addresses the role of relatedness in achievement settings.

This chapter begins by providing a summary of the previous chapters, followed by an in-depth discussion of each of the research questions advanced in this study. To this end, the quantitative and qualitative data were mixed by interweaving participant quotes with the results of the statistical tests. Additional interpretations, recommendations, and linkages to the literature were provided throughout this commentary. The dissertation concludes with a discussion of the implications for SDT, observed study limitations, and proposed future research directions.

Dissertation Summary

Asynchronous and synchronous course delivery methods were introduced in Chapter I. Students' feelings of relatedness (i.e., feeling connected to others) was recognized as an important ingredient for success in these emerging modalities. It was noted that courses taught in these formats often limit relatedness development, either by removing spontaneous interaction (e.g., asynchronous delivery) or by introducing seemingly incompatible online and on-campus factions (e.g., synchronous delivery). In conclusion, it was suggested that the strengths of one delivery mode could offset the weaknesses of the other, and accordingly, an asynchronous discussion intervention was proposed for implementation in the current study of synchronous hybrid programs.

A review of the relevant bodies of literature was presented in Chapter II. First, the literature on technology-rich learning environments (TREs) was reviewed to provide important background information on course delivery formats. Second, Ryan and Deci's (2000) self-determination theory (SDT) was identified as the theoretical framework for this investigation. Third, the current study was contextualized in terms of the previous work on relatedness and motivation. Finally, literature on student relationships and networking interventions was reviewed to help inform the design of the implemented discussion activity. Synthesis and analysis of the selected citations revealed a number of gaps in the literature, which were address by this study.

The methodology for this study was described in Chapter III. Specifically, this study sought to determine if an auxiliary discussion intervention was successful for promoting students' perceptions relatedness and self-efficacy for relatedness development beyond the threshold set by typical classroom interactions. As such,

83 synchronous hybrid students were recruited and randomly assigned to either the experimental (n = 41) or control (n = 42) condition, with the auxiliary discussion activity administered to the students in the experimental group. A pretest-posttest experimental design was implemented with the online discussion intervention occurring sequentially in the middle of the two quantitative data collection points. A convergent parallel mixed methods approach was utilized to collect both quantitative and qualitative data on students' perceptions of relatedness in synchronous hybrid learning environments. Descriptive characteristics were reported along with the legitimation procedures implemented to address reliability, validity, and trustworthiness.

The results of this study were presented in Chapter IV. Data analysis involved a battery of statistical tests performed using quantitative survey data as well as a thematic synthesis of participants' responses to open-ended, qualitative survey items. These analyses were performed to address seven research questions that collectively examined bivariate relationships posited by SDT, group differences based on attendance mode, and the effectiveness of the intervention. The quantitative data showed that the students who participated in the intervention improved their self-efficacy for developing relatedness with individuals in the online attendance mode. Another favorable outcome of the intervention was that it mitigated previously observed differences in relatedness between online and on-campus students. In regard to the thematic analysis, the following assertion emerged from the qualitative data: Relatedness development in synchronous hybrid courses requires a dynamic mix of nutriments that can be satisfied or thwarted differently for every student.

In this chapter, the quantitative and qualitative research strands were mixed to produce an overall interpretation based on the multiple data sources. The sections below begin with a detailed description of the mixing point; then the merged results are presented in the context of the study's seven research questions. Additional interpretations, recommendations, and linkages to the literature are also provided. The chapter ends by identifying important implications, limitations, and future directions.

Mixing Quantitative and Qualitative Research Strands

A key principle of mixed methods design is identifying the mixing point where the quantitative and qualitative strands are combined (Creswell & Plano Clark, 2011). This investigation used a convergent parallel approach in which numeric and text data were first analyzed separately to address the research questions, and then merged for interpretation. Thus, the mixing point for this study was the final discussion of the findings. At this point, the separate paradigmatic foundations of the quantitative and qualitative research questions were suspended, "allowing for new and deeper dimensions to emerge" (Jick, 1979, p. 604).

The purpose of mixing the quantitative and qualitative strands was to produce triangulated results based on the multiple data sources used in this study (QUAN + qual = triangulation; Creswell & Plano Clark, 2011). This approach enhanced the overall rigor of the study such that multiple data points were converged to support the findings (Bryman, 2006; Greene, Caracelli, & Graham, 1989). To this end, participant quotes and the results of the statistical tests were brought together to provide a better understanding of the research problem (Jick, 1979). The triangulated results are presented below in accordance with each research question.

Research Questions

Question 1: Do the bivariate linear relationships posited by SDT manifest within the synchronous hybrid learning environment?

The observed bivariate correlations provided strong support for the tenability of SDT in synchronous hybrid learning environments. In particular, nearly all of the dimensions of need satisfaction (i.e., autonomy, competence, and relatedness) were significantly correlated with intrinsic motivation in a positive direction and with amotivation in a negative direction. It was also found that perceived success for program achievement and technology use each had a significant large positive relationship with intrinsic motivation and a significant large negative relationship with amotivation.

Although it is important to remember that correlations do not represent a causal inference (Warner, 2013), the comments made on the open-ended survey questions suggested that students recognized a connection between need satisfaction and performance. Although students discussed autonomy and competence, which provided additional support for SDT, quotations concerning peer relatedness were of particular interest to this study. For example, Mary (on-campus student), described how feeling connected to others (i.e., relatedness) improved her class participation. "The more comfortable I am with my classmates," she explained, "the more likely I am to speak up and contribute in class." In sum, these findings highlighted the importance of peer relatedness for success in synchronous hybrid courses.

Given the focus of this study on relatedness development, an additional set of Pearson correlations were conducted to assess the degree of association between relatedness and select variables that potentially affect relatedness development. The results indicated that the occurrence of technology failure events was negatively

correlated with students' perceptions of relatedness. In this vein, Olivia (online student) described her frustration building relatedness with peers in the synchronous hybrid learning environment stating, "I wish I could, but there are technological issues. Sometimes I cannot see nor hear my classmates." The data also revealed a significant large positive relationship between extraversion and relatedness. Lisa (online student) succinctly summarized this finding with the following comment: "I think all in all, you have to love to be social when it comes to any program—graduate or undergraduate, MPA or biology, online or on-campus. It does not matter. What matters is your personality." This perspective corroborates the work of Orifici (1997) who asserted that students' relationship seeking behaviors are a function of their personality type.

Overall there is a strong alignment with the correlations observed in this study and those reported in previous empirical investigations of SDT in TREs. In particular, Butz et al. (2014) and Geisbers et al. (2013a) reported strong positive correlations among need satisfaction, motivation, and learning experiences. Roca and Gagné (2008) also found that an increase in students' perceptions of autonomy, competence, and relatedness can have a positive influence on learners' motivation to use technology. No previous studies, however, have focused specifically on relatedness support in synchronous hybrid learning environments. As such, the correlations reported above, particularly those involving relatedness, make an important contribution to the field. Educational practitioners and researchers could use the results of this study as a foundation for further exploration in this area.

Question 2: Do online and on-campus students have different pretest scores on any of the study variables?

The second and third research questions examined the group differences between online and on-campus students on the pretest and the posttest respectively. For the most part, the results were consistent across both time points. Some of the variables, however, were not measured on the posttest, and consequently, these findings are addressed below. This section also provides commentary on the observed difference regarding students' feelings of relatedness, which became nonsignificant on the posttest. Results that were observed consistently on both the pre- and the posttest are addressed in the next section, along with an expanded discussion of the change in significance regarding relatedness.

One interesting finding that emerged from the pretest data was that online students reported a stronger desire for forming relationships with other online students than the alternative modality—on-campus students. Likewise, on-campus students reported a stronger desire for forming relationships with other on-campus students than they did with online students. The comments generated on the open-ended survey items echoed these quantitative results. Sarah (on-campus student) acknowledged her aversion stating, "I don't see the value in having a virtual relationship with any classmates that aren't here in person." Similarly, Kevin (online student) said, "I just don't think that any of the on-campus students care about the online students." However, it should be noted that the mean scores for students' self-reported desire to connect with the opposite attendance mode were above the arithmetic midpoint (i.e., $M > 2.50$) for both groups (possible response options ranged from 1 = *Not at all* to 5 = *To a great extent*). This indicated that, in general, neither online nor on-campus students were overtly opposed to

the possibility of forming relationships with classmates, both within and across attendance modes.

The pretest data also showed that on-campus students reported higher levels of relatedness than their online counterparts. Max (online student) vividly described this fissure in the learning environment as "a natural wall of separation between online and on-campus students." Similar findings regarding the relational deficiencies in synchronous hybrid programs have emerged at each time point in this program of research, including the pilot tests. As such, this observed difference contributed to the body of evidence justifying the need for this study.

Previous research on TREs has also identified social isolation (i.e., feeling low levels of relatedness with peers) as a significant area of concern for emerging delivery modes (Glazer & Wanstreet, 2011; Vrasidas & Zembylas, 2003; Williams, Duray, et al., 2006). Cameron et al. (2009) suggested that part of the problem may be that students do not see the value in developing relationships. Accordingly, one possible recommendation would be for faculty members to reinforce the importance of relatedness development within their courses. Brown (2001) asserted that discussing the importance of peer relationships early in a semester creates a perceived need that students will strive to fill. In addition, the results of this study suggested that providing a platform for auxiliary interaction can also mitigate the separation between online and on-campus students.

Question 3: Do online and on-campus students have different posttest scores on any of the study variables?

The third research question paralleled the second in that it examined mean differences between online and on-campus students; however, these analyses were conducted with posttest, rather than pretest data. As noted above, both datasets yielded

similar results. This section begins by presenting some of the consistent findings before discussing the results that were unique to the posttest.

The five types of motivation identified by the SDT framework were assessed at both measurement times, and for each dataset, mean scores did not differ significantly between online and on-campus students. Likewise, pre- and posttest data revealed that no significant differences existed between online and on-campus students in terms of perceived program success, perceived success in technology use, or program GPA. Taken together, these results lend support to the continued use of synchronous hybrid learning environments in higher education. This finding is particularly important as demonstrating equivalence between delivery modes has become essential for meeting various accreditation standards.

An additional set of comparisons involving the basic needs showed that autonomy scores were significantly higher for the on-campus group on both the pre- and posttest. Although online students are able to attend class from home, some still felt limited by the synchronous requirement of the format. To this point, Desiree (online student) said bluntly, "I'd like the freedom to be able to complete tasks in a way that works for me." As noted in Chapter I, asynchronous modalities provide pedagogical freedom from space and time (Collins & Berg, 1995; Picciano, 2001); however, this freedom comes at the cost of live, spontaneous interaction.

The pretest and posttest data also indicated that online and on-campus students continued to report significantly higher levels of self-efficacy for relatedness development with classmates in their same attendance mode, versus with peers who attend using the opposite modality. According to Tessa (on-campus student), the courses

are not taught in a way that is conducive to forming relationships. She suggested that "if the teachers would give us more opportunity to interact with online students and vice versa, things may be different." Quotations such as this served to underscore the need for this study, as the implemented intervention was, in part, designed to create just such an opportunity.

Perhaps the most noteworthy finding regarding this set of mean comparisons was that the posttest data—unlike the pretest data—showed no significant differences between online and on-campus students in terms of relatedness. Up to this point, on-campus students' relatedness scores surpassed those of their peers online at each data collection point spanning five semesters. Therefore, this departure from the trend marked an important finding within the scope of this program of research.

The current study corroborated the findings of a number of previous studies that have identified positive outcomes associated with online discussion (LaPointe & Gunawardena, 2004; Rabe-Hemp et al., 2009; Rovai, 2001). It is important to note, however, that many factors could have contributed to the amelioration of this previously significant difference in online and on-campus students' relatedness scores. For this reason, more direct evidence of the effectiveness of the intervention is presented in the following sections.

Question 4: Do relatedness and SERD scores differ between the pretest and the manipulation check for students in the experimental group?

The fourth research question examined whether or not the intervention was effective in improving relatedness and SERD scores for students in the experimental group directly following their participation in the discussion activity. The results indicated that students' SERD-OL scores on the manipulation check were significantly

higher than those observed on the pretest. The qualitative comments suggested that this positive outcome was partly attributable to the dual dialogic and photo sharing elements of the intervention. To this end, Elizabeth (on-campus student) said, "Now that I can put a face to some of the names of the online students, I have an easier time remembering things about them. I see them as more 'human,' as opposed to just an online presence."

Despite these encouraging results, the data also showed that there were no significant changes in students' relatedness and SERD-OC scores between the pretest and the manipulation check. In response to the open-ended question on whether or not the intervention was effective for developing relationships, Scott (online student) contended that "it is a pretty cursory format for interaction so I can't say that I really got to know anybody in a way that would equate to a personal relationship." Comments such as this suggested that more robust relationship-building activities may be necessary to promote relatedness and scaffold students' self-efficacy for relatedness development with on-campus students.

The literature on social presence theory also suggests that simply responding to a peer-authored post does not create a lasting bond between the parties involved (Short et al., 1976). From this perspective, a one-time intervention, such as the one tested in this study, would more realistically address an individual's perception of copresence (Nowak, 2001). Based on this conclusion, it is recommended that instructional designers carefully considered the social goals of a course, as different types of interaction will be necessary to facilitate perceptions of copresence as opposed to the authentic connections that characterize true relatedness.

Question 5: Do relatedness and SERD scores differ between the pretest and the posttest for students in the experimental group?

The findings of the previous research question showed that students in the experimental condition improved their SERD-OL scores between the pretest and the manipulation check, indicating that, with respect to this outcome, the intervention was successful in the immediate term. Using data from the pre- and posttest, this research question explored whether or not the observed increase in SERD-OL persisted from the time when the intervention ended to the point when SERD-OL was assessed again at the end of the semester. Indeed, the results indicated that students in the experimental group maintained their elevated SERD-OL scores on the posttest.

In spite of this positive outcome, however, it should be noted that relatedness and SERD-OC scores did not differ significantly between the pretest and the posttest. To this point, the literature suggests that some students are drawn to technology-mediated learning environments because they anticipate minimal requirements for social interaction (Brown, 2001; Hopper, 2003; Liu et al., 2007). In point of fact, Max (online student) offered the following commentary explaining how social connections were not a priority in his enrollment decision:

> Developing relationships was not a goal of mine upon entering the program. My primary objectives were to obtain new skills and knowledge through the expertise of the professors and from engaging in the coursework. These objectives are unaffected by any classmate relationships or lack thereof.

Given that not all students desire social interaction, one viable recommendation for practice is to introduce more flexibility in synchronous hybrid course design. That is, instructors could create an open virtual space, such as the one used in this study, where

students could meet freely to form connections and work collaboratively on class assignments. By making collaboration optional, students who prefer a more solitary learning experience could choose to work independently. The main point is that students who want to learn through peer interaction should be given the pedagogical space to do so.

Question 6: Do relatedness and SERD scores differ between the pretest and the posttest for students in the control group?

The former set of analyses established that those who participated in the intervention improved their SERD-OL scores between the pre- and posttest. However, throughout the normal course of the semester students in both the experimental and control groups would have had several opportunities to interact with their classmates. As such, a parallel mean comparison with students in the control group was necessary to determine that the elevated SERD-OL scores observed with the experimental group were, in fact, attributable to their participation in the intervention.

The results revealed no significant difference between pre- and posttest SERD-OL scores for students in the control group, thereby providing evidence that students' experiences in the intervention contributed to the observed increase in their SERD-OL scores. As a case in point, Olivia (online student) offered the following reflection on her experiences in the program prior to participating in the intervention: "It felt like a parallel learning process—we would have classes together, but we did not interact." Accordingly, the validation of this relatedness building tool makes an important contribution to literature on social support strategies for TREs.

The finding regarding students' elevated SERD-OL scores was encouraging in that it suggested even a simple introductory discussion intervention could help remove

the invisible barriers inherent in synchronous hybrid delivery. Prior to participating in the intervention, these perceived barriers left some students feeling incapable of developing relationships with classmates in the online modality. In the words of Brittany (online student), "The biggest challenge in this type of program, I think, is getting the online and on-campus students to even know who the other is—the initial introduction."

The literature also suggests that introduction activities are essential for forming relationships in TREs. Liu et al. (2007) noted that even a simple introduction activity can empower students to share their previous experiences, which in turn, may help establish familiarity among classmate. Likewise, Stepich and Ertmer (2003) found that introductions at the beginning of class allow students to identify commonalities upon which further interaction can be built. As such, it can be concluded that faculty members teaching in a synchronous hybrid program would do well to prioritize the introduction component of their courses. Sufficient time and a dedicated virtual space, such as the one used in this intervention, can help reinforce this important step in relatedness development.

Question 7: What themes emerge regarding the qualitative statements made by students who participated in the asynchronous online discussion intervention?

The thematic, qualitative data analysis presented in Chapter IV revealed that three key themes impact relatedness development in synchronous hybrid learning environments: *Student Relatedness Beliefs*, *Program Delivery*, and *Student-Interface Interaction*. These themes were summarized into one comprehensive assertion: Relatedness development in synchronous hybrid courses requires a dynamic mix of nutriments that can be satisfied or thwarted differently for every student. From a phenomenological perspective (Husserl, 1962), it is assumed that this final assertion

accurately reflect the lived experiences of synchronous hybrid students as described by the participants. The essence of the data, however, is that not all students have the same experience using the synchronous hybrid system, signifying that different students may benefit from different supports. Nevertheless, frequencies of students' binary (yes/no) responses to the open-ended survey items revealed that the majority of both online and on-campus students thought the implemented intervention was effective for developing relationships with peers in the opposite delivery mode. "I loved the activity!" exclaimed Elizabeth (on-campus student), "There were a few online students in the activity whose names I recognized from my class, but this was my first opportunity to interact with them! It changed my perspective and attitude towards my online classmates."

It is, perhaps, testimonies from students such as Elizabeth that provide the strongest support for the use of online discussion as a relatedness building tool in synchronous hybrid learning environments. Additional evidence was garnered from the quantitative results. In particular, paired samples *t*-test conducted between the pre- and posttest showed that students who participated in the intervention improved their self-efficacy for developing relatedness with online students, while those in the control group did not. One caveat, however, is that the binary response frequencies for the open-ended questions indicated that most students in the experimental condition did not plan to change their actions in class, nor did they anticipate continuing to build relationships with the individuals whom they connected with during the activity. As such, the findings suggested that while the intervention served as a valuable forerunner of relatedness in the short term, more scaffolding would be needed to promote a continued commitment to relatedness development.

The literature review for this study offered one succinct suggestion to promote long-term relatedness development: get started early. Previous studies conducted in various research contexts showed that helping students to get off to an early start with relatedness development allows them to form more lasting connections (Brown, 2001; Cameron et al., 2009; Shackelford & Maxwell, 2012; Stepich & Ertmer, 2003). In particular, Brown (2001) found that online students generally take a longer time to create bonds of friendship than their on-campus counterparts, and therefore, it is critical to start promoting peer relationships at the beginning of the course. Stepich and Ertmer (2003) further indicated that building relationships early allows students to become familiar with their classmates' views on various issues, thereby enticing more lively discussion throughout the semester.

Overall, few practitioners would contest the benefits of nurturing student relationships throughout the semester; however, the inroads to true relatedness have been elusive for many. The current study provided evidence in support of using online discussion as a relatedness building tool in synchronous hybrid learning environments. This chapter concludes with a discussion of the implications for SDT, observed study limitations, and proposed future research directions.

Implications for SDT

The findings noted above hold implication for SDT theorists, providing strong support for the continued use of SDT for future research involving synchronous hybrid programs. In particular, this study substantiated three key elements of SDT: the basic needs, the types of motivation, and the importance of contextual support. This section

describes the contributions made in each of these areas as well as the implications that the findings hold for SDT as a whole.

Basic Needs

Pre- and posttest data from the online and on-campus students showed that all of the basic needs were positively correlated with intrinsic motivation and negatively correlated with amotivation. It was also found that online and on-campus students' extrinsic motivation scores were not significantly correlated with any of the basic needs on the pre- or posttest. Taken together, these findings establish motivation as a multidimensional process that reflects the degree to which the basic needs have been satisfied or thwarted in a given social context (Ryan & Deci, 2000).

In spite of the accumulated research that supports this postulate, few measurement instruments to date parse out the basal components of the basic needs. The current program of research addressed this gap in terms of relatedness development in TREs. As such, this program of research advanced the SERD scale to assess students' self-efficacy for relatedness development with online and on-campus peers in synchronous hybrid learning environments. This new measure holds important implications for SDT research in that it has the potential to facilitate more in-depth investigations of relatedness development in a variety of TREs.

Types of Motivation

With the exception of amotivation, the results of this study indicated that the types of motivation identified by SDT were positively associated with online and on-campus students' perceptions of success for program achievement on the pre- and posttest. In contrast, amotivation was found to have a negative relationship with perceived success

for program achievement. These findings supported Ryan and Deci's (2000) observation that more self-determined types of motivation tend to result in positive outcomes, while less self-determined types lead to negative outcomes.

In opposition to this dichotomy, the results of this study showed that extrinsic and introjected motivation also had strong positive relationships with perceived success for program achievement, especially for on-campus students. According to Ryan and Deci (2000), extrinsically motivated behaviors tend to cease when the external motivator is no longer present, and therefore, it may be assumed that the short time horizon for this study was not adequate to detect negative effects. In terms of implications for SDT, this suggests that all of the types of motivation may have positive effects on achievement in the short term. Additional research with a longer interval between data collection points would be needed to determine if the passage of time in synchronous hybrid programs dulls the association between perceived success and the less self-determined types of motivation.

Contextual Support

Ryan and Deci (2000) asserted that contextual support for the basic psychological needs enhances motivation and well-being. The most significant contribution of this study in terms of contextual support is that the results showed that participation in an asynchronous online intervention can improve synchronous hybrid students' self-efficacy for relatedness development with individuals in the online attendance mode. In practice, however, all three of the basic needs should be addressed in the context of synchronous hybrid programs. As a case in point, the results of this study identified another deficiency between attendance modes. The empirical data showed that on-campus students reported

greater levels of autonomy than their online peers on both the pre- and posttest. This suggests that the online group may feel constrained by the limitations of the course delivery system. As such, the findings of this study hold implications for SDT research on contextual support in synchronous hybrid programs. That is, it may become necessary for future efforts in this area to use multiple support strategies to ensure that all of the basic needs are addressed.

Taken together, the findings discussed in this section lend strong support for the tenability of SDT in synchronous hybrid learning environments. This study further contributes to SDT by presenting seminal results showing the utility of contextual support in terms of self-efficacy for relatedness development. By exploring the foundation of relatedness development, this study provided additional insight into the antecedents of motivation as conceptualized by SDT. It is hoped that this research will serves as a pathway to further exploration of need support, need satisfaction, and motivation in synchronous hybrid learning environments.

Limitations

The results of the current study suggested that the implemented intervention not only improved self-efficacy for relatedness development with online peers, but also mitigated previously observed significant differences in relatedness between online and on-campus students. The contributions of this investigation, however, must be interpreted in light of the study's limitations. As noted in Chapter I, this study had three main limitations, which are reviewed below.

First, the participants for the current study were recruited from existing synchronous hybrid MBA, MPA, and MS-Avit programs offered at a large U.S.

research university. These programs are highly specialized, and for the most part, attract a select group of individuals with a particular set of professional goals. Furthermore, it should be noted that students self-selected into the online or on-campus groups, and while participants were randomly assigned to either the experimental or control condition, those individuals who were not willing to participate in the intervention were automatically assigned to the control group. Even though independent samples *t*-tests confirmed that the experimental and control groups did not have statistically different mean scores prior to the intervention, this departure from the random assignment procedure may have introduced unaccounted for factors regarding students' preference to receive the intervention or to attend class using one delivery mode verses the other. In sum, the results of this study may have limited generalizability for students in other programs.

Second, the results may have been constrained by the limited time frame over which the data were collected. The pretest, intervention, and posttest were all administered within one 16-week semester. Accordingly, it was not possible to determine whether or not the effects of the intervention are sustainable over a longer period of time. Likewise, only one set of GPA data was available for this time period, thereby limiting the longitudinal analysis to self-report measures of student performance.

Finally, the three synchronous hybrid programs that comprised the sampling frame each have a diverse body of faculty members. It should be noted, therefore, that participants' experiences in these programs were based on a multitude of synchronous hybrid courses taught by various instructors. Logically, the faculty members in these programs vary in terms of attitude, teaching style, and technological proficiency. As such,

these variations likely influenced students' responses to the quantitative and qualitative survey items.

Future Research

The quantitative and qualitative findings reported in this study provided valuable insight into relatedness development within synchronous hybrid learning environments. The tested intervention, however, failed to improve participants' perceptions of relatedness or self-efficacy for relatedness development with on-campus peers, suggesting that it should be redesigned prior to future implementation. In addition, the data analysis process revealed a number of further considerations for the next effort in this program of research. This section outlines three possibilities for subsequent intervention studies examining peer relatedness development in TREs.

First, in terms of redesigning the intervention, future studies should incorporate a sequence of events that take place at various time points over the course of the semester. In this regard, prolonged engagement in a socially supportive environment may promote students' relatedness and SERD-OC scores, which are two areas of need that remained unimproved in the current study. As a case in point, Olivia (online student) made the following remark: "I believe this was an important experience, but I do not think it will help to develop long-term relationships, because we are talking about a one-time action." Accordingly, the next deployment of the intervention tested in this study should involve a program of staggered interactions, which according to Nowak (2001), would elevate learners' perceptions of copresence to that of true social presence.

Second, this study used relatedness and self-efficacy for relatedness development as outcome variables by which to assess the effectiveness of the intervention; however,

future research should consider introducing additional measures such as well-being, emotions, or loneliness. The current set of outcome variables had a strong theoretical aliment with Ryan and Deci's (2000) SDT, but it should be noted that adopting other perspectives could broaden the scope of the findings. Furthermore, selecting additional outcome measures may help uncover previously overlooked dimensions of relatedness development.

Third, this study used a relatively small sample. A larger, more diverse sample would provide additional statistical power to identify meaningful effects. Therefore, future research should include other universities in the sampling frame. Likewise, this study only examined graduate students within the disciplines of business, public administration, and aviation. The next effort in this program of research could focus on undergraduate students as well as other programs.

Summary

The purpose of this study was to examine the effects of an asynchronous online discussion intervention on students' perceptions of relatedness and self-efficacy for relatedness development in synchronous hybrid learning environments. The results indicated that the students who participated in the intervention improved their self-efficacy for relatedness development with individuals in the online attendance mode. In addition, the intervention mitigated previously observed differences in relatedness between online and on-campus students. Qualitative comments from the students who participated in the intervention also revealed that relatedness development requires a dynamic mix of nutriments that can be satisfied or thwarted differently for

every student. These findings will become increasingly important as institutions continue to migrate toward technology-rich learning environments.

Every year educators encounter new tools, features, and instructional methods designed to facilitate teaching and learning in a variety of course formats. This rapid innovation of instructional technology has changed the way many students experience education, and in no small way, the balance between success and failure will hinge on the quality of students' social experiences within these emerging modalities. Although this challenge is ongoing, the current study offered a theoretically grounded approach to scaffolding relatedness development in this new paradigm of course delivery.

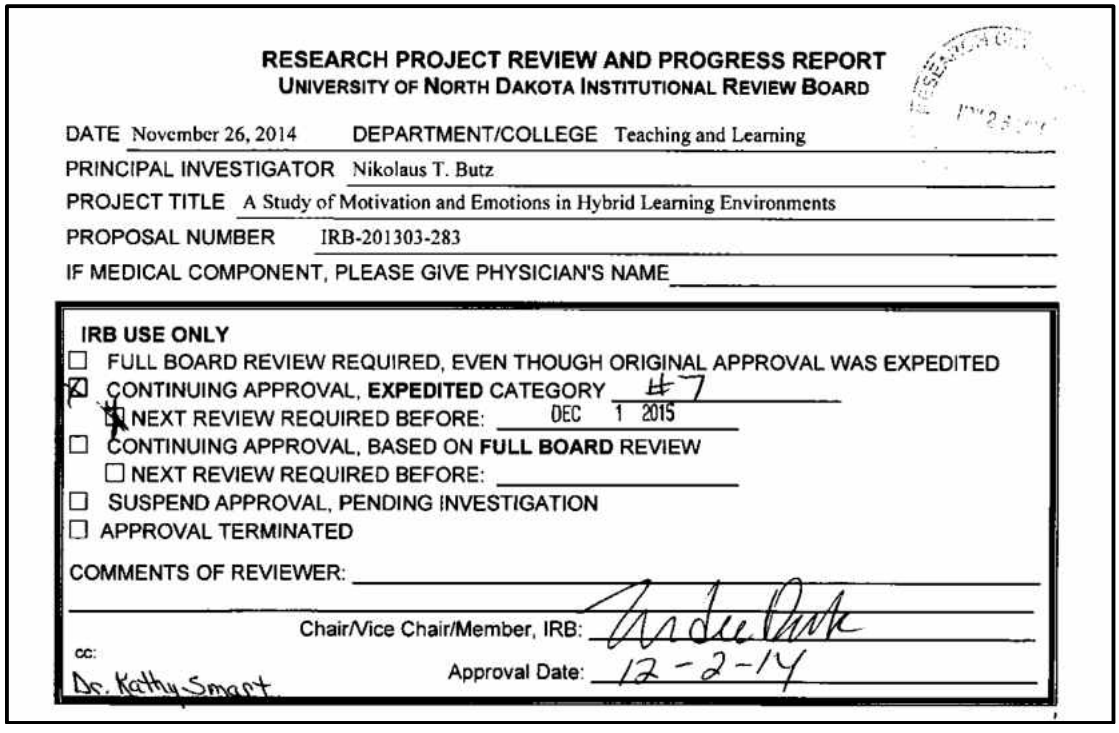
APPENDICES

Appendix A
Institutional Review Board Approval

Table 23. Summary of IRB Submissions.

IRB Submission	Date of Approval	Purpose / Outcome
Initial IRB Submission (Cross-sectional Study)	**03/25/2013**	**Initiate Study**
Protocol Change (1st)	04/30/2013	Share data with study collaborators in CoBPA (All collaborators have competed IRB Education)
Protocol Change (2nd) (Mixed methods study)	**10/10/2013**	**Adopt longitudinal design, add MS-AVIT students, obtain GPA data**
Annual Project Review and Progress Report (1st)	01/28/2014	Continued approval granted
Protocol Change (3rd)	02/20/2014	Obtain approval for qualitative interview questions
Protocol Change (4th)	04/17/2014	Add independently developed SERD scale to survey
Protocol Change (5th) (Dissertation Study)	**08/25/2014**	**Revise survey, initiate discussion board activity, obtain approval for random assignment procedure**
Annual Project Review and Progress Report (2nd)	12/02/2014	Continued approval granted

Note. New research efforts within the current program of research are identified in boldface.



RESEARCH PROJECT REVIEW AND PROGRESS REPORT
UNIVERSITY OF NORTH DAKOTA INSTITUTIONAL REVIEW BOARD

DATE November 26, 2014 DEPARTMENT/COLLEGE Teaching and Learning
PRINCIPAL INVESTIGATOR Nikolaus T. Butz
PROJECT TITLE A Study of Motivation and Emotions in Hybrid Learning Environments
PROPOSAL NUMBER IRB-201303-283
IF MEDICAL COMPONENT, PLEASE GIVE PHYSICIAN'S NAME

IRB USE ONLY
☐ FULL BOARD REVIEW REQUIRED, EVEN THOUGH ORIGINAL APPROVAL WAS EXPEDITED
☒ CONTINUING APPROVAL, **EXPEDITED** CATEGORY #7
☒ NEXT REVIEW REQUIRED BEFORE: DEC 1 2015
☐ CONTINUING APPROVAL, BASED ON **FULL BOARD** REVIEW
☐ NEXT REVIEW REQUIRED BEFORE:
☐ SUSPEND APPROVAL, PENDING INVESTIGATION
☐ APPROVAL TERMINATED
COMMENTS OF REVIEWER:
Chair/Vice Chair/Member, IRB:
cc: Dr. Kathy Smart
Approval Date: 12-2-14

Figure 16. Documentation of IRB Approval.

Appendix B
Study Timeline

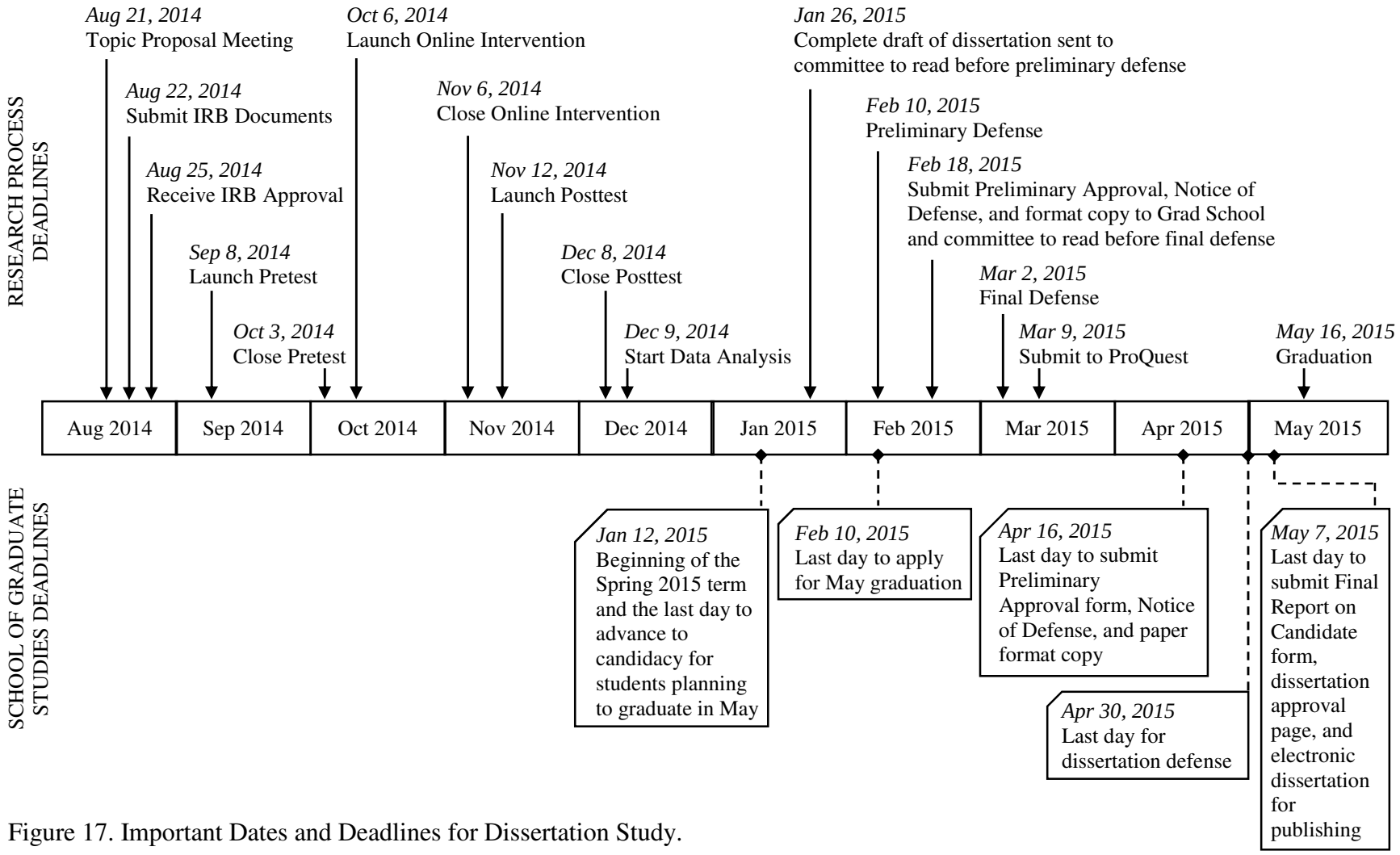


Figure 17. Important Dates and Deadlines for Dissertation Study.

Appendix C
Pre/Posttest Survey Codebook

This survey codebook contains information about the variable names that were used in the dataset. In order to identify potential changes in the measured variables over the course of the study, the pre/posttest survey instrument was identical (aside from one nonrepeated pretest item that asked students to indicate their willingness to participate in the online discussion board activity). The "TP" at the end of each variable name stands for "Time Point." These letters were replaced with "01pre" in the pretest dataset and "02post" in the posttest dataset. Variables in boldface were added during analysis, rather than provided by participants. These added variables did not count toward the total number of survey items.

System Variables:

Name	Item
ResponseIDTP	ID assigned by the Qualtrics™ survey engine

ParticipantID	ID assigned by researcher – String, Width 7 (E.g., 1510001)
	First 4 characters: Term code
	1510 = Fall of the 2014 – 15 Academic Year
	Last 3 digit: Participant # assigned sequentially when sorted A-Z by last name
	001 = The first participant identified when last names are sorted alphabetically

Group	(1) On-campus Control; (2) Online Control; (3) On-campus Experimental; (4) Online Experimental
mcYNTP	(0) Student did not participate in the intervention, (1) Student did participate in the intervention
IPaddressTP	IP address of computer used to complete survey
startdateTP	Date and time survey started
enddateTP	Date and time survey completed
totaltimeTP	Total time to complete survey
finishTP	(1) Finished survey, (2) Did not finish survey
firstnameTP	First name
lasttnameTP	Last name
outlierTP	(0) Responses are not suspicious, (1) Responses are a potential problem
outlierreasonTP	Reason identified as outlier
undemailTP	University email address
prefemailTP	Preferred email address
consentynTP	(1) Yes, I consent, (2) No, I do not consent
experimentYNTP[a]	(1) Yes, I would be willing to participate in the asynchronous discussion activity (2) No, I would not be willing to participate in the asynchronous discussion activity
resultsTP	(1) Yes, I would like to receive a summary of the results; (2) No, I would not like to receive a summary of the results
gpaYNTP	(1) Yes, I consent to provide access to my GPA (2) No, I do not consent to provide access to my GPA
emplidTP	EMPL ID number
TGPA	Term GPA

Note. [a] This item appeared only on the pretest.

Demographics:

Name	Item
genderTP	What is your gender? (1) Male, (2) Female, (3) Other
ageTP	What is your age in years? [In text box, enter exact number]
ethnicwhiteTP ethnicblackTP ethnicamindianTP ethnicmexicanTP ethnicasianTP ethnicpacificTP ethnicpuertoTP ethniclatinoTP	Are you (check all that apply) . . . ___ White/Caucasian ___ African American/Black ___ American Indian ___ Mexican American/Chicano ___ Asian American/Asian ___ Pacific Islander ___ Puerto Rican American ___ Other Latino
EnglishTP	Is English your first language? (1) Yes, (2) No
marryTP	Are you currently… (1) Married (2) Unmarried, living with partner (3) Single (4) Separated, divorced, or widowed
programTP	Please indicate your program: (1) Master of Business Administration (MBA) (2) Master of Public Administration (MPA) (3) Master of Aviation (MS-Avit)
worktimeTP	Are you currently: (1) Unemployed, (2) Working part-time, (3) Working full-time
workexpTP	How many years of professional work experience did you have in your field when you began the MBA/MPA/MS-Avit program: [In text box, enter exact number]
majorTP_text	Please indicate your UNDERGRADUATE major and minor (e.g., Accounting, Marketing, Business Administration, Aviation Management, Commercial Aviation, etc.): [In text box, enter name of major]
minorTP_text	[In text box, enter name of minor]
advncdegTP	Do you have any other advanced degrees or certificates (excluding pilot licenses)? (1) Yes, please indicate [In text box, enter name of advanced degree or certificate] (2) No
residenceTP	How far away do you live from the UND main campus in Grand Forks, ND while completing the MBA/MPA/MS-Avit program? (1) I live on-campus (2) I live off-campus, but within the city of Grand Forks, ND (3) I live within the state of North Dakota (4) I live outside North Dakota, but still in the USA, please indicate state: [Enter state] (5) I live outside the USA, please indicate country: [Enter country]

Program Experience:

The following questions are in regards to your experience in the MBA/MPA/MS-Avit program.

Name	Item
f2fonlineTP	At present how do you primarily attend MBA/MPA/MS-Avit courses? (1) On-campus face-to-face (2) Online through the Adobe Connect™ system
studenttimeTP	Which of the following best describes your current enrollment status in the MBA/MPA/MS-Avit program? (1) Part-time (2) Full-time
hrscompTP	Please estimate how many credits hours you have completed in the MBA/MPA/MS-Avit program (e.g., 9, 12, 18, etc.): *Note.* The MBA program requires 24 credits in core business courses and 6 - 9 credits of electives for a total of 33 credits hours. The MPA program requires 26 credits in public administration courses and up to 9 credits in cognate fields to total 35 credits. The MS-Avit program thesis option requires 27 credits and a 4 credit thesis for a total of 31 credits and the MS-Avit independent study option requires 30 credits and a 2 credit independent study for a total of 32 credits. [In text box, enter exact number]
hrspersemTP	How may credits hours do you typically take per semester in the MBA/MPA/ MS-Avit program? (e.g., 3, 6, 9, etc.) [In text box, enter exact number]
favf2fTP	Regardless of how you attend the MBA/MPA/MS-Avit program, how would you rate face-to-face course delivery in terms of learning? (1) highly unfavorable, (2) somewhat unfavorable, (3) neither favorable nor unfavorable, (4) somewhat favorable, (5) highly favorable
favonlineTP	Regardless of how you attend the MBA/MPA/MS-Avit program, how would you rate online course delivery in terms of learning? (1) highly unfavorable, (2) somewhat unfavorable, (3) neither favorable nor unfavorable, (4) somewhat favorable, (5) highly favorable
elearningexpTP	Prior to beginning the MBA/MPA/MS-Avit program, how much experience did you have with online courses or courses that utilized web-conferencing technology such as Adobe Connect™? (1) None, (2), (3), (4), (5) Substantial
DesireconnectOCTP	To what extent do you desire building connections with your classmates who attend on-campus? (1) Not at All, (2), (3) Neutral, (4), (5) To a great extent
DesireconnectOLTP	To what extent do you desire building connections with your classmates who attend online (i.e., via Adobe Connect™)? (1) Not at All, (2), (3) Neutral, (4), (5) To a great extent

Basic Need Satisfaction (Autonomy, Competence, and Relatedness):

The following questions concern your thoughts and feelings regarding your **OVERALL EXPERIENCE** in the UND MBA/MPA/MS-Avit program.
Please indicate how true each of the following statement is for you:

1 = Strongly disagree, 4 = Neutral, 7 = Strongly agree

Name	Item
	Autonomy Satisfaction
autonSTP_1	In the MBA/MPA/MS-Avit program, I feel a sense of choice and freedom in the things I undertake.
autonSTP_2	I feel that my decisions in the MBA/MPA/MS-Avit program reflect what I really want.
autonSTP_3	My choices in the MBA/MPA/MS-Avit program express who I really am.
autonSTP_4	I feel I have been doing what really interests me in the MBA/MPA/MS-Avit program.
	Autonomy Thwarting
autonTTP_1	Most of the things I do in the MBA/MPA/MS-Avit program feel like "I have to."
autonTTP_2	In the MBA/MPA/MS-Avit program, I feel forced to do many things I wouldn't choose to do.
autonTTP_3	I feel pressured to do too many things in the MBA/MPA/MS-Avit program.
autonTTP_4	My daily activities in the MBA/MPA/MS-Avit program feel like a chain of obligations.
	Competence Satisfaction
comptSTP_1	I feel confident that I can do things well in the MBA/MPA/MS-Avit program.
comptSTP_2	When I am attending MBA/MPA/MS-Avit classes, I feel capable at what I do.
comptSTP_3	In the MBA/MPA/MS-Avit program, I feel competent to achieve my goals.
comptSTP_4	I feel I can successfully complete difficult tasks in the MBA/MPA/MS-Avit program.
	Competence Thwarting
comptTTP_1	In the MBA/MPA/MS-Avit program, I have serious doubts about whether I can do things well.
comptTTP_2	I feel disappointed with my performance in the MBA/MPA/MS-Avit program.
comptTTP_3	When I am attending classes in the MBA/MPA/MS-Avit program, I feel insecure about my abilities.
comptTTP_4	In the MBA/MPA/MS-Avit program, I feel like a failure because of the mistakes I make.
	Relatedness Satisfaction
relateSTP_1	I feel that the people I care about in the MBA/MPA/MS-Avit program also care about me.
relateSTP_2	In the MBA/MPA/MS-Avit program, I feel connected with people who care for me, and for whom I care.
relateSTP_3	I feel close and connected with other people who are important to me in the MBA/MPA/MS-Avit program.
relateSTP_4	I experience a warm feeling with the people I spend time with in the MBA/MPA/MS-Avit program.
	Relatedness Thwarting
relateTTP_1	When I am attending classes in the MBA/MPA/MS-Avit program, I feel excluded from the group I want to belong to.
relateTTP_2	I feel that people who are important to me in the MBA/MPA/MS-Avit program are cold and distant towards me.
relateTTP_3	I have the impression that people I spend time with in the MBA/MPA/MS-Avit program dislike me.
relateTTP_4	I feel the relationships I have in the MBA/MPA/MS-Avit program are just superficial.

Adapted from:

Van den Broeck, A., Vansteenkiste, M., De Witte, H., Soenens, B., & Lens, W. (2010). Capturing autonomy, competence, and relatedness at work: Construction and initial validation of the Work-Related Basic Need Satisfaction scale. *Journal of Occupational & Organizational Psychology, 83*(4), 981-1002. doi: 10.1348/096317909X481382

Technology Failure Events:

1 = Not at all, 4 = Slightly less than average,
7 = Slightly more than average, 10 = Very frequently

Name	Item
techfailTP	Regardless if you attend online or on-campus, to what extent have you experienced **COMPUTER ISSUES** or **TECHNOLOGY FAILURES** during the MBA/MPA/MS-Avit program (e.g., system crashes, connection errors, audio and video failures, etc.)?

Extraversion:

Here are a number of characteristics that may or may not apply to you. Please indicate the extent to which you agree or disagree with each statement.

1 = Disagree strongly, 2 = Disagree a little,
3 = Neither agree nor disagree,
4 = Agree a little, 5 = Agree strongly

I see myself as someone who...

Name	Item
extraverTP_1	...is talkative.
extraverTP_2	...is reserved. **R**
extraverTP_3	...is full of energy.
extraverTP_4	...generates a lot of enthusiasm.
extraverTP_5	...tends to be quiet. **R**
extraverTP_6	...has an assertive personality.
extraverTP_7	...is sometimes shy, inhibited. **R**
extraverTP_8	...is outgoing, sociable.

Note. Statements ending in a boldface "**R**" signify negatively worded items that were reverse coded in SPSS before creating the combined scale.

Adapted from:

Rammstedt, B., & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. *Journal of Research in Personality, 41*(1), 203–212. doi: 10.1016/j.jrp.2006.02.001

Self-Efficacy for Relatedness Development (with Online Peers):

These items pertain to the relationships you have formed with your peers **online**.

1 = Not at all true, 5 = Very true

Name	Item
serelatedevolTP_1[a]	I can bridge the gap to make connections with online students.
serelatedevolTP_2	Interactions with my online classmates enable me to form meaningful relationships.
serelatedevolTP_3	I am able to overcome barriers that prevent me from building friendships with online students.
serelatedevolTP _4[a]	I can develop social relationships with my online classmates.
serelatedevolTP _5	I am able to connect with online students, regardless if I attend class online or on campus.
serelatedevolTP _6	I have no problem developing relationships with online students.

Self-Efficacy for Relatedness Development (with On-Campus Peers):

These items pertain to the relationships you have formed with your peers **on-campus**.

1 = Not at all true, 5 = Very true

Name	Item
serelatedevocTP_1[a]	I can bridge the gap to make connections with on-campus students.
serelatedevocTP_2	Interactions with my on-campus classmates enable me to form meaningful relationships.
serelatedevocTP_3	I am able to overcome barriers that prevent me from building friendships with on-campus students.
serelatedevocTP_4[a]	I can develop social relationships with my on-campus classmates.
serelatedevocTP_5	I am able to connect with on-campus students, regardless if I attend class online or on campus.
serelatedevocTP_6	I have no problem developing relationships with on-campus students.

Note. The unpublished Self-Efficacy for Relatedness Development (SERD) scale displayed above was developed by Nikolaus T. Butz at the University of North Dakota in May 2014.

[a] Items 1 and 4 were found to be highly repetitive with other items and were removed based on their limited contribution to scale's overall dimensionality.

Motivation:

Using the scale below, indicate to what extent the following items correspond to the reasons, thoughts, and feelings regarding **WHY YOU ARE PURSING** your MBA/MPA/MS-Avit.

1 = Does not correspond at all, 4 = Corresponds moderately, 7 = Corresponds exactly

Name	Item
	Intrinsic motivation - to know
intrinTP_1	Because I experience pleasure and satisfaction while learning new things.
intrinTP_2	For the pleasure I experience when I discover new things never seen before.
intrinTP_3	For the pleasure of broadening my knowledge about subjects that appeal to me.
intrinTP_4	Because my studies allow me to continue to learn about many things that interest me.
	Extrinsic motivation - identified
identTP_1	Because I think an MBA/MPA/MS-Avit degree will help me better prepare for the career I have chosen.
identTP_2	Because eventually an MBA/MPA/MS-Avit degree will enable me to enter the job market in a field that I like.
identTP_3	Because an MBA/MPA/MS-Avit degree will help me make a better choice regarding my career orientation.
identTP_4	Because I believe that a few additional years of education will improve my competence as a worker.
	Extrinsic motivation – introjected
introjTP_1	To prove to myself that I am capable of completing the MBA/MPA/MS-Avit program.
introjTP_2	Because of the fact that when I succeed in the MBA/MPA/MS-Avit program I feel important.
introjTP_3	To show myself that I am an intelligent person.
introjTP_4	Because I want to show myself that I can succeed in the MBA/MPA/MS-Avit program.
	Extrinsic motivation - external regulation
extrinTP_1	Because with only an undergraduate degree I would not find a high-paying job later on.
extrinTP_2	In order to obtain a more prestigious job later on.
extrinTP_3	Because I want to have "the good life" later on.
extrinTP_4	In order to have a better salary later on.
	Amotivation
amotTP_1	Honestly, I don't know; I really feel that I am wasting my time in the MBA/MPA/MS-Avit program.
amotTP_2	I once had good reasons for being in the MBA/MPA/MS-Avit program; however, now I wonder whether I should continue.
amotTP_3	I can't see why I am in the MBA/MPA/MS-Avit program and frankly, I couldn't care less.
amotTP_4	I don't know; I can't understand what I am doing in the MBA/MPA/MS-Avit program.

Adapted from:

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Brière, N. M., Senécal, C. B., & Vallières, E. F. (1992). The academic motivation scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement, 52*(4), 1003-1017. doi:10.1177/0013164492052004025

Perceived Success (Academic):

This part of the questionnaire refers to your **OVERALL EXPERIENCE** in the MBA/MPA/MS-Avit program.

Since you began the MBA/MPA/MS-Avit program, how **SUCCESSFUL** do you feel…

1 = Very unsuccessful, 4 = Somewhat successful, 7 = Very successful

Name	Items
psuccprogTP_1	…you are in the MBA/MPA/MS-Avit program overall?
psuccprogTP_2	…about the grades you got on tests and assignments in the MBA/MPA/MS-Avit program?
psuccprogTP_3	…in achieving the learning goals you set for yourself?
psuccprogTP_4	…when it comes to knowing that you made an honest effort to make progress during the year?
psuccprogTP_5	…in doing all the work, meeting deadlines, keeping up with the reading, studying, etc.?
psuccprogTP_6	…in gaining new knowledge and understanding from your courses?

Adapted from:

Hall, N. C., Hladkyj, S., Perry, R. P., & Ruthig, J. C. (2004). The role of attributional retraining and elaborative learning in college students' academic development. *Journal of Social Psychology, 144*(6), 591-612. doi: 10.3200/SOCP.144.6.591-612

Perceived Success (Technology):

This part of the questionnaire refers to your experience in relation to using **TECHNOLOGY** in the MBA/MPA/MS-Avit program.

Since you began the MBA/MPA/MS-Avit program, how **SUCCESSFUL** do you feel…

1 = Very unsuccessful, 4 = Somewhat successful, 7 = Very successful

Name	Items
psucctechTP_1	…in using the technology required in the MBA/MPA/MS-Avit program?
psucctechTP_2	…in your ability to use technology to achieving the learning goals you set for yourself?
psucctechTP_3	…in doing the work that involves technology?
psucctechTP_4	…in becoming proficient with the technology required in the MBA/MPA/MS-Avit program?
psucctechTP_5	…in using technology to gain new knowledge and understanding from your courses?
psucctechTP_6	…about the results of your efforts in using technology in the MBA/MPA/MS-Avit program?

Adapted from:

Hall, N. C., Hladkyj, S., Perry, R. P., & Ruthig, J. C. (2004). The role of attributional retraining and elaborative learning in college students' academic development. *Journal of Social Psychology, 144*(6), 591-612. doi: 10.3200/SOCP.144.6.591-612

Appendix D
Manipulation Check Survey Codebook

Students in the experimental group were asked to compete the following brief exit-survey manipulation check directly following their participation in the asynchronous online discussion activity. The "TP" at the end of each variable name stands for "Time Point." These letters were replaced with "mc" in the manipulation check dataset. Variables in boldface were added during analysis, rather than provided by participants. These added variables did not count toward the total number of survey items.

System Variables:

Name	Item
ResponseIDTP	ID assigned by the Qualtrics™ survey engine

ParticipantID	ID assigned by researcher – String, Width 7 (E.g., 1510001)
	First 4 characters: Term code
	1510 = Fall of the 2014 – 15 Academic Year
	Last 3 digit: Participant # assigned sequentially when sorted A-Z by last name
	001 = The first participant identified when last names are sorted alphabetically

IPaddressTP	IP address of computer used to complete survey
startdateTP	Date and time survey started
enddateTP	Date and time survey completed
totaltimeTP	Total time to complete survey
finishTP	(1) Finished survey, (2) Did not finish survey
firstnameTP	First name
lastnameTP	Last name
outlierTP	(0) Responses are not suspicious, (1) Responses are a potential problem
outlierreasonTP	Reason identified as outlier
undemailTP	UND email address
prefemailTP	Preferred email address
consentynTP	(1) Yes, I consent (2) No, I do not consent

Program Experience:

Name	Item
f2fonlineTP	At present how do you primarily attend MBA/MPA/MS-Avit courses? (1) On-campus face-to-face (2) Online through the Adobe Connect™ system

Perceptions of the Discussion Activity (Open-ended)

Please describe your experience participating in the online discussion activity. Do you feel that the activity was effective for developing relationships with peers in your program who attend using the opposite delivery format? Why or why not? Please be specific.

Name	Items
perceptextTP_1	[In text box, enter comments]

Relatedness in the MBA/MPA/MS-Avit program:

The following questions concern your thoughts and feelings regarding your **OVERALL EXPERIENCE** in the UND MBA/MPA/MS-Avit program.
Please indicate how true each of the following statement is for you:

1 = Strongly disagree, 4 = Neutral, 7 = Strongly agree

Name	Item
	Relatedness Satisfaction
relateSTP_1	I feel that the people I care about in the MBA/MPA/MS-Avit program also care about me.
relateSTP_2	In the MBA/MPA/MS-Avit program, I feel connected with people who care for me, and for whom I care.
relateSTP_3	I feel close and connected with other people who are important to me in the MBA/MPA/MS-Avit program.
relateSTP_4	I experience a warm feeling with the people I spend time with in the MBA/MPA/MS-Avit program.
	Relatedness Thwarting
relateTTP_1	When I am attending classes in the MBA/MPA/MS-Avit program, I feel excluded from the group I want to belong to.
relateTTP_2	I feel that people who are important to me in the MBA/MPA/MS-Avit program are cold and distant towards me.
relateTTP_3	I have the impression that people I spend time with in the MBA/MPA/MS-Avit program dislike me.
relateTTP_4	I feel the relationships I have in the MBA/MPA/MS-Avit program are just superficial.

Adapted from:

Van den Broeck, A., Vansteenkiste, M., De Witte, H., Soenens, B., & Lens, W. (2010). Capturing autonomy, competence, and relatedness at work: Construction and initial validation of the Work-Related Basic Need Satisfaction scale. *Journal of Occupational & Organizational Psychology, 83*(4), 981-1002. doi: 10.1348/096317909X481382

Self-Efficacy for Relatedness Development (with Online Peers):

These items pertain to the relationships you have formed with your peers **online**.

1 = Not at all true, 5 = Very true

Name	Item
serelatedevolTP_1[a]	I can bridge the gap to make connections with online students.
serelatedevolTP_2	Interactions with my online classmates enable me to form meaningful relationships.
serelatedevolTP_3	I am able to overcome barriers that prevent me from building friendships with online students.
serelatedevolTP _4[a]	I can develop social relationships with my online classmates.
serelatedevolTP _5	I am able to connect with online students, regardless if I attend class online or on campus.
serelatedevolTP _6	I have no problem developing relationships with online students.

Self-Efficacy for Relatedness Development (with On-Campus Peers):

These items pertain to the relationships you have formed with your peers **on-campus**.

1 = Not at all true, 5 = Very true

Name	Item
serelatedevocTP_1[a]	I can bridge the gap to make connections with on-campus students.
serelatedevocTP_2	Interactions with my on-campus classmates enable me to form meaningful relationships.
serelatedevocTP_3	I am able to overcome barriers that prevent me from building friendships with on-campus students.
serelatedevocTP_4[a]	I can develop social relationships with my on-campus classmates.
serelatedevocTP_5	I am able to connect with on-campus students, regardless if I attend class online or on campus.
serelatedevocTP_6	I have no problem developing relationships with on-campus students.

Note. The unpublished Self-Efficacy for Relatedness Development (SERD) scale displayed above was developed by Nikolaus T. Butz at the University of North Dakota in May 2014.

[a] Items 1 and 4 were found to be highly repetitive with other items and were removed based on their limited contribution to scale's overall dimensionality.

Future Relationship Seeking Behaviors (Open-ended)

Based on your experience in the online discussion activity, will you change your actions in terms of seeking relationships with classmates in your program? Please be specific.

Name	Items
behaviorstextTP_1	[In text box, enter comments]

Do you anticipate continuing to build a relationship with the individuals whom you connected with during the online discussion activity? Why or why not?

Name	Items
contrelatetextTP_1	[In text box, enter comments]

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