FORENSIC SCIENCE COURSE STUDENT EFFICACY, TASK VALUE, AND SENSE OF COMMUNITY: COMPARING TRADITIONAL AND VIRTUAL CLASSROOM DESIGNS

by

Jennifer Lynn Hall-Rivera

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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ABSTRACT

Student enrollment in undergraduate online education continues in an increasing trend toward the creation of new virtual degree programs. Academia and university faculty have observed comparable learning outcomes in both traditional and online classrooms, but minimal research exists discussing student perspectives of science-based coursework in these two learning environments. A specific discipline within scientific programs which continues to demand student interest is Forensic Science degree programs. Forensic Science coursework requires tangible application of content learning in addition to confidence in task completion. Forensic Science also necessitates a sense of connectedness amongst a team of individuals, as peer collaboration and discovery are essential. Therefore, developing an understanding of student self-efficacy, task value, and sense of community in Forensic Science classrooms is essential to promoting effective degree programs in both the traditional and online classrooms. This quasi-experimental nonequivalent group design research study sought to examine these variables within a Forensic Science Criminal Investigation course in a large, private university within comparable classrooms in the traditional and online classrooms. Data were collected from student surveys using the *Motivated Strategies for Learning Questionnaire (MSLQ)* self-efficacy and task-value subscales and the *Classroom Community Scale (CCS)* to measure the sense of community. The research results demonstrated a statistically significant difference between students' classroom modality (traditional and online) when analyzing sense of community but no statistical significance was identified in student's self-efficacy and task value based on classroom modality.

Keywords: Traditional classroom, online classroom, forensic science, self-efficacy, sense of community, task value.

Dedication

First and foremost, I dedicate this research to my Lord and Savior, Jesus Christ. This would not have been possible without His grace, support, and guidance throughout the entire process. The Bible promises that through Him all things are possible, and the completion of this dissertation process is evidence of God's promise. My prayer is to continue to serve Him diligently, follow Him faithfully, and worship Him continually.

Secondly, this dissertation is dedicated to my family and friends, whose support and prayers throughout this process have been instrumental in my success. Thank you to my wonderful parents, who instilled in me the perseverance to complete all tasks to fruition, to value integrity in both personal and professional character, and to recognize the importance of reverence to the one true God. Thank you to my husband and four, beautiful daughters. Each of you continually encouraged me in so many ways through this long process with your patience, prayers, smiles, and hugs. Thank you to my dear friends who supported me each step of the way.

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Analysis of Variance (ANOVA)

Classroom Community Scale (CCS)

Motivated Strategies for Learning Questionnaire (MSLQ)

Multivariate Analysis of Variance (MANOVA)

Statistical Package for the Social Sciences (SPSS)

CHAPTER ONE: INTRODUCTION

Overview

Classroom environments, whether traditional or online, potentially impact learning outcomes, student motivation, and student perception of academic success. Traditional, face-to-face classrooms are commonly recognized as the mode of instruction found in postsecondary education, but online education continues to increase at a rate of 10% per year (Forte, Schwandt, Swayze, Butler, & Aschcraft, 2016; Potter, 2015). Traditional classrooms are defined as a face-to-face encounter between teacher and student, where academic instruction and assessments occur within the physical classroom (Potter, 2015). In contrast, online classrooms are recognized as student learning and testing occurring exclusively through a web-based medium (Mgutshini, 2013).

Background

According to the U.S. Department of Education (2016), in 2013, over five million postsecondary students were enrolled in some form of distance course, with 13.1% of these students classified as exclusively participating in online education. Friedman (2016) stated in 2014, over 5.8 million students were enrolled in a minimum of one online course, while greater than 50% of college graduates in the last decade enrolled in at least one online coursework before graduation. As of 2016, one in four students is currently enrolled in online academic programs (OLC, 2016). With steady projected increases in online education, researchers have discussed the demand for online coursework in all academic discipline as the number one issue facing college administration (Friedman, 2016).

When considering the development of coursework for both traditional and online programs, careful consideration should be given to the age parameters of the students enrolling.

The average age of the traditional undergraduate student is under the age of twenty-five, while nontraditional students are over the age of twenty-five (Swanke & Zeman, 2015). Historically, the traditional classroom is comprised primarily of students under the age of twenty-five, while the online classroom is a mix of traditional and nontraditional students. The reason for this distribution within the traditional classroom, is the face-to-face classroom does not offer the flexibility needed by the working, adult learner (Soares, 2013). Interestingly, there is an expected 23% increase of nontraditional students in the residential classroom over the next three years, as older adults recognize the value of higher education and are returning to college to enhance their careers (Soares, 2013).

Though many research studies have found little or no difference between the cognitive capabilities and end-of-course assessment of traditional and online students, there is significant differences in confidence levels (Simonds & Brock, 2014; Swanke & Zeman, 2015). Traditional students, those under the age of 25, tend to exhibit higher confidence levels in the virtual classroom (Davies, Cotton, & Korte, 2016; Simonds & Brock, 2014). This is largely attributed to the traditional student being comfortable with technological platforms. In contrast, the online, nontraditional students tend to spend greater amounts of time in online discussion boards and related activities (Simonds & Brock, 2014). When accounting for the experience level of the nontraditional student, research has discovered a negative correlation between experience level and course grades. This may demonstrate that students with moderate experience in their field of study may have difficulty answering textbook answers and instead, tend to draw from their work-based knowledge (Swanke & Zeman, 2015).

In general, traditional classroom environments are the most common form of education and are engrained in pedagogy and instructional learning in universities (Potter, 2015). The

traditional, face-to-face learning environment allows the teacher to provide immediate feedback, assess student learning through verbal and nonverbal cues, and seize opportunities for student inquiry. A recognized pillar of education, John Dewey, described an effective learning environment as one in which the teacher and student are free to engage in dialogue and exploratory learning in a traditional, face-to-face encounter (Fogg, Carlson-Sabelli, Carlson, & Giddens, 2013). Students enrolled in the traditional learning environment have expressed a preference for the physical presence of the instructor due to the immediacy of instructor feedback (Buck, Cook, Quigley, Prince, & Lucas, 2014). Traditional classroom students also perceive increased levels of self-efficacy and sense of community when allowed to collaborate with peers in a face-to-face encounter.

Though the support for the traditional classroom is apparent, the current generation of techno-savvy students is calling for additional online coursework and degree programs. The demand for online coursework has resulted in long-term projections for virtual classrooms by educational leaders (Frimming, Bower, & Choi, 2013). These degree programs include science-based forensic science and criminal justice concentrations. Considering the effectiveness of the traditional science classroom in supporting student learning, research has formulated comparable learning outcomes in online science coursework (Halupa & Caldwell, 2015).

Positive aspects for students engaging in online science coursework include a self-paced, autonomous learning environment with flexibility and the convenience of studying at home (Kauffman, 2015). Additionally, online students are privy to customization of their coursework through a vast array of technological tools and platforms (Potter, 2015). Communication and collaboration between students are improved in online forums, as they are not inhibited by face-to-face conversation (Potter, 2015). When reviewing the effectiveness of online science

programs, the virtual classroom is largely comprised of online lab experiences which replicate the traditional, hands-on laboratory applications, while providing the freedom of replicating the experiment away from the physical lab.

Apparent positive factors of the online science classroom are shadowed by questions regarding authentic cognitive learning (Kemp et al., 2014). This is primarily due to the lack of hands-on mastery expected of students in science degree programs. Science educators have expressed similar concerns due to the observed learning gains in their students enrolled in the face-to-face classroom (Kemp et al., 2014). The tangible nature of science laboratories, whether physical engagement or virtual simulation, requires a certain level of cognitive manipulative capability, or active involvement amongst the students and teachers.

Active involvement occurring in the science classroom, whether traditional or online, is often considered constructivist in nature. Vygotsky, a constructivist theorist, derived the Social Cultural Theory, which suggested student learning occurs when the interactions between the teacher and student are active and fluid (Park, 2015). Vygotsky (1978) supported the philosophy of knowledge acquisition through the medium of a tool or instrument, designed to be a conduit of information. Mediums or tools relative to this research are the type of classroom modality, traditional or online, and the related resources these types of classrooms provide the student.

As technology offered the educational community the opportunity to develop online science courses, researchers recognized the need to modify the Social Cultural Theory to reflect these changes. The product of this formulation was Activity Theory, developed by Engeström (1999). Activity Theory attempts to incorporate the actions and behaviors of individuals, through the use of a medium or tool within society (Xing, Guo, Petakovic, & Goggins, 2014). Subsequently, the subjects and actions of the community (or school) will inevitably affect the

activity, which is considered the key factor in the Activity Theory (Engeström, 1999). The use of the activity system occurring within the traditional or online science classroom has the potential to influence the self-efficacy, task value, and sense of community occurring within these two modalities.

Debates regarding the most competent activities to promote student learning continues to surface in research (Kemp et al., 2014). Advocates of both traditional and online classrooms continue to voice their narrative regarding the strengths of these modalities, but further research is necessary to provide support to curriculum development as universities continue to convert their science coursework into online programs (Crippen, Archambault, Keru, 2012). Interest in one particular science field, the field of forensics, has sparked the creation of undergraduate degrees dedicated to the field of forensic science and the study of criminal investigation (The Economist, 2010). These newly designed specialty science degrees, i.e. forensic science, have been formulated to appease student interests and produce knowledgeable graduates for the law enforcement community.

Considering the constructivist nature of forensic science through hands-on application, there is need to research the confidence levels and perceived mastery of forensic science students in both online and residential students. The very nature of forensic science disciplines requires in-depth knowledge of the manipulation and application of equipment, in addition to the relevant processes and procedures (Saferstein, 2016). Therefore, it is important to examine the differing aspects of residential and online education through the lens of the student in relation to self-efficacy, task value, and sense of community.

Problem Statement

National, state, and local criminal investigation agencies are anticipating a 27% increase in forensic science related positions before the year 2024 (Forensic Colleges, 2016). In conjunction with forensic job openings, there is an increased demand for course offerings in the forensic disciplines (The Economist, 2010). Agencies are requesting graduates of forensic programs be knowledgeable of the hands-on procedures required in a forensic investigator: the identification, collection, and packaging of forensic evidence (Lehman, 2012). Forensic Science requires tangible application, in-depth knowledge of related practices, and thorough investigative techniques (Saferstein, 2016). Therefore, it is essential that educational institutions investigate student perception of the effectiveness of forensic programs, traditional and online, in developing confidence in skills learned and the ability to collaborate with peers toward resolution.

Since little research exists in the field of forensic science postsecondary traditional versus online education, the focus of this study examined whether online forensic science students perceive themselves as possessing the same confidence in their capabilities as those in a traditional program? Do online forensic science students value their course knowledge of forensic science practices at the same level as traditional, face-to-face students? In addition, do online forensic science students experience the same feelings of connectedness as traditional students? These key areas were the focus of investigation in this research study.

Purpose Statement

The purpose of this quantitative study was to compare the self-efficacy, task value, and sense of community in undergraduate students enrolled in a criminal investigation course in traditional and online classrooms. These courses were comparable in course content and overall expectations, as outlined in the course syllabi. The students in both classroom modalities, traditional and online, were provided a web link to an online survey at the onset of the course, in

addition to the end of the coursework. The survey link provided at the onset of the course outlined instructions for completion, in addition to an expiration date. This study utilized a survey to ask the researched-based questions, rated on a Likert scale. Two measurements were used for the evaluation, the *Motivated Strategies for Learning Questionnaire (MSLQ) Self-efficacy subscale* to examine the students' self-efficacy and the *Task Value subscale* to measure the students perceived task value of the course. To measure sense of community, the *Classroom Community Scale (CCS)* was utilized within both course modalities.

Research suggests that online coursework is comparable to the experience received within the traditional classroom (Kauffman, 2015). In a national survey of post-secondary deans in 2015, 71.4% of these academic supervisors believed virtual education is equivalent to traditional instruction and 41.7% stated online education is not only preferred, but more effective in supporting cognitive learning (Allen, Seaman, Poulin, & Straut, 2016). With over 70% of universities in the United States offering a form of online degree program, the support for the effectiveness of virtual education is prevalent (Johnson, 2015). Considering these research findings, this study sought to examine the students' perception in these classroom modalities, specifically forensic science students, to assess whether their confidence levels and sense of connection supports this research or tends to lean toward a preference for face-to-face instruction.

The above referenced research provides a limited example of both sides of the pedagogical spectrum. Considering the volume of research available on traditional versus online education, little has been published on the comparisons between science-based traditional and online classrooms. This specifically applies to forensic science undergraduate coursework, where research on this topic is minimal. Due to the tangible nature of forensic science

coursework and the information learned through experimentation and practice, further research is needed in this area. Therefore, the purpose of this research study was to add to the literature, research, and overall perceived effectiveness of traditional and online education within the forensic science criminal investigation classroom.

Significance of Study

Understanding students' perception of community and accomplishment in the online classroom is important to further develop effective learning platforms which foster student achievement. There is a priority by university administrators to move science lab course into the virtual classroom (Jeschofnig & Jeschofnig, 2011). As one of the primary goals of online education is to replicate the face-to-face learning experience in a virtual medium (Artyushina & Sheypak, 2012), the necessity exists to compare factors which directly impact student perseverance and academic success in both the traditional and online classroom. For this present study, these factors include student self-efficacy of curriculum content, the task value, along with sense of connectedness to both peers and the university, each of which has the potential to influence the other variable.

Self-efficacy has precedence for correlating perseverance with self-confidence (Alt, 2015). The students' perceived levels of confidence in learning effect their overall outcomes in both performance and motivation (Johnson, Edwards, & Dai, 2014). Assessing student self-efficacy provides the educational community with insight into "behavioral outcomes" and "cognitive skills" reflected in the study body (Alt, 2015, p. 51). Student self-efficacy, and overall self-confidence, is largely influenced by the ability of students to interact and collaborate with one another. Collaboration has been found to nurture students' interest in the science disciplines through exploratory learning and problem solving (Buck et al., 2014). Therefore, it is

not surprising that collaborative opportunities develop a sense of connectedness to the learning environment.

Several research studies have examined student self-efficacy and sense of community in the traditional classroom. Bandura (1986) endeavored to identify and define four sources of self-efficacy: "enactive mastery experiences", observational experiences, social persuasion, and physiological and affective states. Each of these sources is affected by peer collaboration and modeling, within traditional classroom environment, as students are motivated through social awareness and encouragement (Alt, 2015). By understanding and advancing techniques that develop these sources, which thereby influence greater levels of self-efficacy and community, universities are better equipped to scaffold these concepts to the online classroom.

Though empirical research has shown that both the traditional and online classrooms offer comparable learning experiences and academic achievement (Jan, 2015), minimal research has documented student self-efficacy and sense of community in science-based online coursework. Additionally, there is no research which examines criminal investigation forensic science students' self-efficacy, task value, or sense of connectedness in the traditional, face-to-face or online classroom. With the rise in student enrollment in forensic science degree programs (Jackson, 2009), in addition to online coursework, universities are eager to examine the ability of online science-based programs to provide comparable learning opportunities to that of the traditional classroom (Jeschofnig & Jeschofnig, 2011). This research added to the literature comprised of self-efficacy, task value, and sense of community in students enrolled in online science coursework and provided new insight into the Forensic Science Criminal Investigation traditional and online classrooms.

Research Questions

This study investigated the following research question.

RQ1: Is there a difference in forensic science criminal investigation students' self-efficacy dependent on the type of modality (traditional and online) enrolled?

RQ2: Is there a difference in forensic science criminal investigation students' task value dependent on the type of modality (traditional and online) enrolled?

RQ3: Is there a difference in forensic science criminal investigation students' sense of community dependent on type of modality (traditional and online) enrolled?

Definitions

1. *Activity Theory* – A framework for learning in which students and teachers engage in a system designed toward designated objectives which are influenced by the socio-cultural norms of the environment, ultimately resulting in innovation and change (Mendez & Lacasa, 2015).
2. *ANOVA* – The Analysis of Variance determines the statistical significance in the mean scores of two or more groups on one or more dependent variables (Gall, Gall, & Borg, 2007).
3. *Classroom Community Scale (CCS)* – Developed by Rovai (2002) to measure the sense of community existing in a learning environment.
4. *Communities of Practice* – The development of shared interest and values in a group through various forms of communication and discussion forums available in a network of resources (Erdogan, 2016).
5. *Constructivism* – The construction of knowledge achieved in the classroom through communication, collaboration, and activity between students where the teacher acts as a tutor or mentor (Juvova, Chudy, Neumeister, Plischke, & Kvintova, 2015).

6. *Criminal Investigation* – The discipline within the criminal justice system that focuses on the investigation and resolution of crimes at the local, state, and federal levels (Osterburg & Ward, 2013).
7. *Face-to-face instruction* – Face-to-face instruction is considered to occur within a traditional classroom or a web-based live instructional session with a teacher (Allen et al., 2016).
8. *Forensic Science* – The application of science to the criminal justice system through the examination of criminal and civil laws (Saferstein, 2016).
9. *MSLQ* – The Motivated Strategies for Learning Questionnaire was a survey developed by a team of researchers at the University of Michigan to assess and improve university-level education through teaching and learning (Pintrich, Smith, Garcia, & McKeachie, 199).
10. *Online instruction* – Classroom instruction delivered at a distance through the use of technological platforms, media, and online curriculum (Rovai, 2002).
11. *Self-efficacy* – The students' perception and confidence in their ability to control their learning, motivation, and academic achievement (Alt, 2015).
12. *Sense of community* – McMillan and Chavis (1986) define sense of community as a four-fold experience: sense of belonging to a group, a sense of mattering through the ability to influence, sense of fulfillment through peer support, and emotional attachment through shared experiences.
13. *SPSS*: The Statistical Package for Social Science is a software program designed to for perform statistical calculations (SPSS, Version 22.0).

14. *Task value* – The students' viewpoint of how valuable and useful a specific task is in relation to the importance of the coursework (Pintrich et al., 1991).
15. *Traditional classroom* – The traditional classroom is where instructional pedagogy is delivered orally via a face-to-face encounter with the instructor (Allen et al., 2016).
16. *Virtual classroom* - The virtual classroom refers to a reproduction of learning and instruction encountered in the traditional classroom in an online environment (Artyushina & Sheypak, 2012)

CHAPTER TWO: LITERATURE REVIEW

Overview

This chapter reviews the literature regarding science-based traditional and online modalities and how these frameworks have the potential to contribute to student self-efficacy and sense of community in a forensic science classroom. The chapter begins with a discussion of the theoretical framework, The Activity Theory, followed by the supporting research of science-based traditional and online classrooms exercises, laboratory practices, and mediums used for learning. The focus on the scientific discipline of forensic science is discussed in addition to the importance of mastery in criminal investigation processes and how this relates to student self-efficacy and sense of community.

Theoretical Framework

The theoretical framework for this research study was centered around constructivist-oriented Activity Theory (Engeström, 1999). The Activity Theory is a product of Vygotsky's Socio-Cultural Theory of Learning (Park, 2015) and Leontiev's (1978) Cultural Historical Theory (Méndez & Lacasa, 2015). Constructivism, though filtered throughout education in three distinct waves (social constructivism, individual constructivism, and social-cultural constructivism), primarily achieved consideration during the Piaget's inspired second wave (individualism) due to the focus on the student's innate ability to acquire their own knowledge (Archer, 1998). Piaget believed a continual fluid learning process exists which allows an individual, biologically influenced, to acquire new information and scaffold that knowledge to preexisting ideas and concepts. Though Piaget's theories hold merit in understanding how students learn, the foundation for the emerging theories influencing online learning are attributed to the third wave of constructivism, social-cultural influences (O'Connor, 1998). These were

guided by the influence of Lev Vygotsky and the development of the Socio-Cultural Theory (Churcher, Downs, & Tewksbury, 2014).

Socio-cultural Theory. The initial research surrounding the use of social interactions and activity to enhance student learning, originates with Vygotsky and his Socio-cultural Theory (Vygotsky, 1978; Wang, 2013). As with Piaget's learning theory, Vygotsky believed students were active participants in their learning environment. The distinguishing factor between Piaget and Vygotsky is Piaget's biologically-influenced individualized construction of knowledge to that of Vygotsky's socio-cultural influence, working alongside the psychological processes, in the assimilation of information (Lee, 2011; Park, 2015). Therefore, the acquisition of knowledge is derived from the interactions existing between an individual and their environment (Vygotsky), rather than within the individual themselves (Piaget). This interaction is mediated through the medium of an instrument. The instrument is a construct of physical, mental, or cultural-artifact tool activity (Park, 2015). An instrument or mental tool is anything that provides a form of information (Wang, 2013). Simply stated, "Psychological tools transform natural mental processes into instrumental acts" (Kaptelinin & Nardi, 2009).

Vygotsky (1978) theorized the process of students' response to interactions, primarily through the use of instruments and mental tools, have the potential of redirecting behavior, increasing cognitive functions, and influencing their future educational performance outcomes (Figure 1). These cognitive processes are largely influenced by the external parameters that become internalized into one's psychological higher-order processes (Wang, 2013). An important distinction to be made in the Socio-cultural theory is that learning is individualized, but supported, through social interaction, cultural influence, and collaboration with others through a zone of proximal development (Churcher et al., 2014; Vygotsky, 1978). The zone of

proximal development is focused on student assessment and cognitive retention through collaboration synthesis rather than an individualized performance measure (Kaptelinin & Nardi, 2009). The two indicators reflective of student learning identified by Vygotsky (1978) are (1) the individual learning and (2) the learning acquired through collaborative interaction.

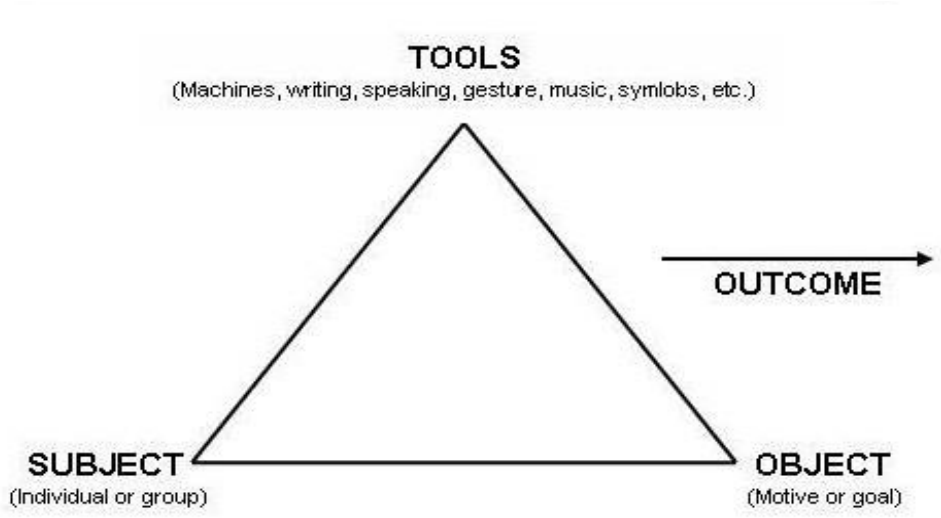

Figure1. First Generation Diagram of the Activity Theory derived from Vygotsky's Social-cultural theory. Adapted from *Perspectives on Activity Theory* by Engeström. Copyright 1999 by Cambridge University Press.

In conjunction with social collaboration, Vygotsky (1978) described student learning as a construction of knowledge which is built upon preexisting conceptions generated through the individual's historical context. Higher order thinking and synthesis are nurtured when individuals are exposed to external learning factors, which in turn build upon prior knowledge (Sağlam, 2015). The result of scaffolding this preexisting knowledge with the current information is a form of authentic understanding, or construction of knowledge, exclusive to the individual learner (Archer, 1998; Wang, 2013). Therefore, every student has the potential to construct their own learning when interacting with external tools, technological mediums, and interaction within learning communities. This form of collaborative learning directly applies to

the forensic science classroom where students are expected to engage in experimentation activity, synthesize results, and construct conclusions.

Communities of Practice. A social theorist, Jean Lave, developed a model of learning called communities of practice. This theory describes the unique relationship existing within the learning community, as a "living curriculum" is practiced amongst the members involved (Wenger, 2009, p. 3). Wenger (1998) further developed the framework for communities of practice. Communities of practice develop connections due to shared interest and values in specified learning forums, further constructing a sense of community (Erdogan, 2016). The shared interest and values are nurtured through various forms of communication and discussion forums through a shared network of resources (Erdogan, 2016).

Considering forensic science students, both traditional and online, would exhibit a communal interest in the study of criminology, sense of community within these forums would be a valid avenue to research and evaluate. Complex student relationships not only exist within the traditional classrooms, but communities of practice provide an avenue of connection in online classrooms across geographic distances (Wenger, 2009). Potentially, communities of practice could influence the students sense of value and confidence in course materials. There are three essential components of communities of practice: "mutual engagement, joint enterprise and shared repertoire" (Gauthier, 2016, p. 8). Mutual engagement is created when a set of shared norms grows through participation in a group (Gauthier, 2016). Joint enterprise is defined as the fluid connection formed between group members, and shared repertoire consists of the communal resources the group develops over time (Gauthier, 2016). Consequently, communities of practice have the potential to thrive within the virtual classroom due to the very nature of a

shared collaborative experience and access of interactive tools while students engage in projects, discussion boards, and information exchange (Wenger, 2009).

The development of technological educational platforms and modalities, in conjunction with the demand for fully online course programs, has sparked interest by researchers to explore how the social cultural theory and learning communities through tool mediation are applied to the virtual classroom. Considering the interaction between the student and learning tools, both physical and virtual, support the construction of knowledge, the research community and academia recognized the need for an evolved theory directly related to activity of online learning and information literacy (Wang, 2013).

Activity Theory. Activity Theory, initially developed by Vygotsky's disciple Leontiev (1903-1979), emerged as a way to explain the interaction (or relationship) occurring between the individual and the activity, or for the purpose of this research the computer (the tool) in the virtual classroom (Wang, 2013). Leontiev combined Vygotsky's social cultural theory, the external influences affecting the individual, and the activity performed by the individual (Wang, 2013). The activity became the mediator between the psychological and social construction of knowledge. Leontiev (1981) explains, "Any activity of an organism is directed at a certain object; an 'objectless' activity is impossible" (Kaptelinin & Nardi, 2009, p. 55). Leontiev (1981), mirroring his mentor Vygotsky, formulated three levels of action (Figure 1): the tools or artifacts used in an activity, the rules and guidelines shaping the activity, and the division of labor and collaboration existing between the involved parties (Engeström, 1999).

Engeström (1999), troubled by the inability of Activity Theory to reflect the effects of one's actions in the collective society, further modified the theoretical framework. Engeström (1999) is attributed as the scholar to develop Leontiev's methodology of the Activity Theory into

a form of analysis which can be applied to multiple research fields in information literacy, online learning, and "human-computer interaction" (Wang, 2013, p. 6). Activity Theory is a psychologically-oriented theory which allows the scientific community to examine the relationship existing between internal human cognition and external instrumental activity (Wang, 2013). Activity Theory is defined by Xing et al. (2014) as, "A social, psychological and multidisciplinary theory that seeks to be naturalistic, offering a holistic framework that describes activities in practice while linking together individual and social behavior" (p. 171). This development in Activity Theory is distinctive in removing the traditional formulation of rote learning into a vibrant environment where the mediation of technology, in various forms, is the contributor to a participatory, collaborative active environment (Kaptelinin & Nardi, 2009).

Engeström (1999) suggested the interactions between students (subject), learning (object), and communication were best described through the connections existing between these variables. The results of these variables influence societal factors such as the group of individuals organizing the activity, the community informed and inspired by the results of the activity, and the "central issue" of the object (Engeström, 1999, p. 31). The incorporation of these additional influences, subject, object, and community, are represented in Figure 2. Other variables affected by these influences is the "social, emotional, cultural," and creativity in the students participating in the activity (Kaptelinin & Nardi, 2009). When learners interact through activity within the science classroom, the students' perception is the effectiveness of learning increases, thereby influencing self-efficacy and sense of connection. Therefore, activity has a singular effect on both social presence and learning outcomes, regardless of classroom modality.

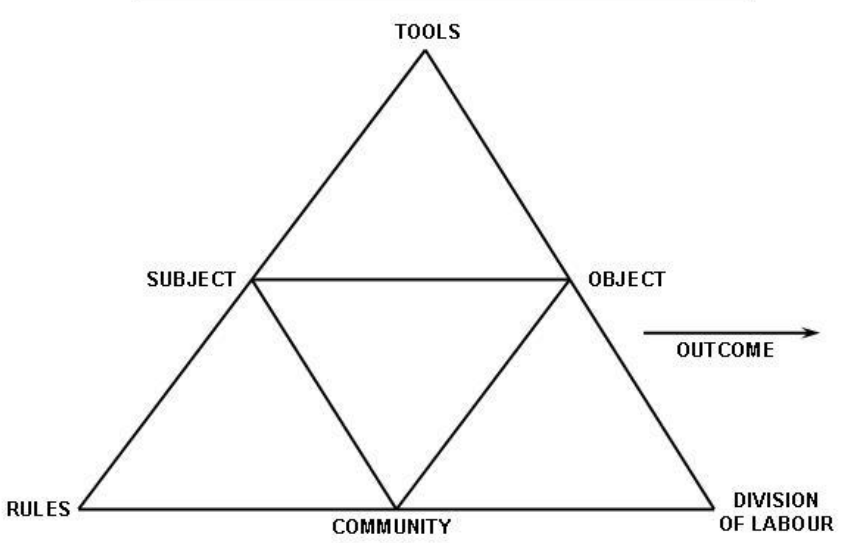

Figure 2. Third Generation Diagram of Activity Theory derived from Vygotsky's Social-cultural theory. Adaption from *Perspectives on Activity Theory* by Engeström. Copyright 1999 by Cambridge University Press.

Since the essence of proposed framework is participatory in nature, this model has acquired the title of Activity Theory. According to activity theorists, "object-related practical activity" is the "proper unit of analysis" to study activity in practice (Roth & Lee, 2007, p. 189). The Activity Theory framework is comprised of five principles (Engeström, 1999; Holmgreen, 2015):

- The unit of analysis is the individual activity
- The individuals involved in the activity contribute personal prior knowledge and historicity
- The activity is governed by "rules, tools, and conventions" (p. 223)
- The evolution of the activity is affected by contradictions, problems existing amongst the activity systems, which influence learning
- The objective and motive of the activity have the potential to change the outcomes.

When considering the activity present within the forensic science classroom, construction of knowledge occurs through community and/or technological interaction occurring between student face-to-face collaboration and/or virtual exploration. Therefore, according to Holmgreen (2015), Activity Theory is "adequate for analysis of activities" when using "digital technologies", and to analyze how using these technologies influences the learning process in students (p. 233). In addition, Activity Theory is the best theory to evaluate the "activity systems of teaching and learning" by studying them within the students' traditional and online learning environments (Lazarou, 2011). Therefore, Activity Theory is an appropriate theoretical framework to examine the discipline of forensic science in both the traditional and online classrooms. The modified Activity Theory model applied to this research study is reflected in Figure 3 and demonstrates the relationship between the tools, the students, the class, the community, the objectives, and parameters shaping the activity.

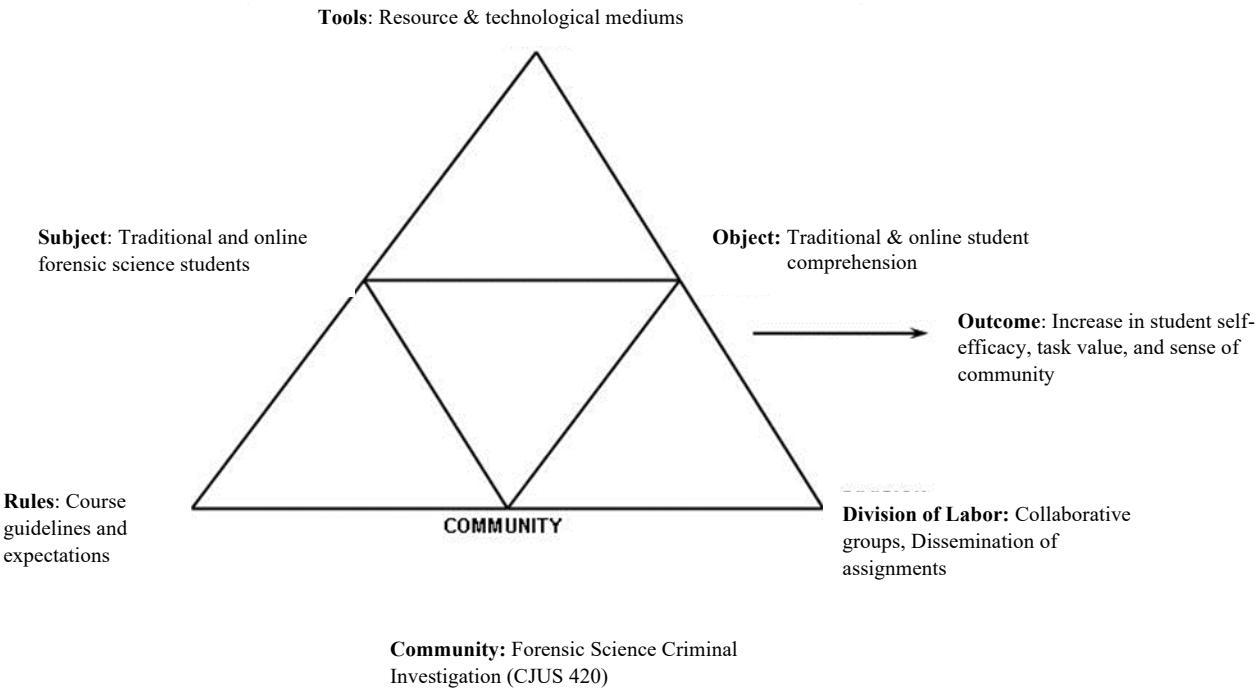

*Figure 3***:** Activity System: Student Efficacy, Task Value, and Connectedness Outcomes. This diagram reflects the variables used for this research existing within the Forensic Science Criminal Investigation on-campus and online classrooms. Adapted from *Perspectives on Activity Theory* by Engeström. Permission to use and modify the activity model granted by Engeström (2016). Copyright 1999 by Cambridge University Press.

Constructivism concerns. A recognized concern with Vygotsky's social constructivism is the suggestion there is no absolute truth, therefore allowing individuals to construct their own understanding (Churcher et al., 2014). Social constructivist supports individual autonomy in the search for truth and scientific meaning, subsequently the lack of belief in absolute truth inherently generates varying individual perspectives of reality (Phillips, 1995). As a Christian supporting a biblical worldview and recognizing the Holy Bible as the inerrant word of God (Psalm 12:6; II Timothy 3:16-17), there are components of constructivism that must be applied to student learning and knowledge acquisition with caution. Absolute truth does exist, and this truth is only found through a relationship with Jesus Christ and in the inerrant Word of God.

Considering this viewpoint, there are foundational components of constructivism which are not in opposition to a biblical worldview such as, uniqueness of individuals, learning through activity, discovery-based learning, learning through instrument interaction, and collaboration through community, all of which can be effectively applied to student learning (Archer, 1998; Thomas & McRobbie, 2013). It is through this biblical lens, the theory of constructivism, social learning, and Activity Theory will be utilized to evaluate online student's self-efficacy, task value, sense of community existing within traditional and online forensic science criminal investigation classrooms.

Related Literature

Students of the current generation are pressing for technology enriched pedagogy within the scientific disciplines, in both the traditional and online classrooms. These technologically proficient students prefer knowledge acquisition through the application of online platforms, designed to engage the learner through virtual laboratories, collaboration, and simulated classroom discussion (Franco, 2013). In addition, this technological generation of students tend to be autonomous in their studies and prefer the flexibility of online learning, in addition to the freedom to complete coursework at their leisure through the use of activities rather than reading and writing (Thompson, 2015).

Considering the demand for online education by this generation, the traditional, face-to-face classrooms remain the most widely used classroom format, though the virtual learning environment has validated significant learning gains in students (Trpkovska, 2011). A steady, gradual increase in online education enrollment is markedly between 10% and 40% (Klaus & Changchit, 2014), while a minimum of 30% of post-secondary students are enrolled in one online course (Frimming, et al., 2013). These thriving virtual opportunities currently encompass all academic disciplines, including skill-based science practicum and laboratory core curriculum (Rivera, 2016).

While enrollment in online education continues to thrive, the age of students enrolled in fully online programs continues to be an area of concern. Research conducted in 2016, found that students enrolled in a fully online community college degree program demonstrated a 26% retention rate for the younger student (< 26 years), in contrast to the 33% retention rate of the older student (26+ years) (James, Swan, & Daston, 2016). These statistics were comparable to primarily online degree universities (James et al., 2016). However, students enrolled in four-year university online degree programs, where the university also offers on-campus traditional

course, demonstrated no difference in retention rates by age (younger students < 26 years: 57%, older students 26+ years: 57%) (James et al., 2016). This suggests that the traditional four-year university, who offers comparable online coursework, is more effective in bridging the connection between the virtual classroom and feelings of connectedness to the school.

The desire to feel connected to the university is also related to the age of the student. When considering sense of community within the online classroom, Schroeder, Baker, Terras, Mahar, & Chiasson (2016) found a significant relationship between age and the desire for connectivity with the online classroom. The researchers discovered those students between "21-25 and 46-50 years of age desired less connectivity" while the students ranging in age from "26-30 and 36-40 years old desired higher connectivity" (Schroeder et al., 2016, p. 255). The results of this study suggest that the age of the student may influence the sense of community within the online classroom.

Science Coursework. While online science education has demonstrated comparable understanding of science-based concepts and practices in undergraduate coursework (Johnson & Lillis, 2010), a question has disseminated through academic channels on the authentic application of virtual education in the fields of lab-based science coursework, student self-efficacy in their learning, and authentic cognitive retention (Leong, 2011). The inability to tangibly manipulate laboratory equipment, as well as engage in hands-on, real-life experiences, often creates disparity between the student and the content. Science coursework also entails a comprehensive understanding of science inquiry, processes, and the scientific method, all of which require interaction and communication between students (Dewitt, Saedah, Alias, and Hai Leng, 2013). This concern holds merit in scientific fields, i.e. forensic science, where hands-on

application and mastery is essential as a student enters the discipline of criminal investigation and related inquiry processes.

Due to the escalation of online science course offerings, the educational community is developing innovative techniques to scaffold hands-on science to a virtual classroom (Rivera, 2016). Though virtual experimentation has provided the online student with a variety of opportunities to participate in simulated traditional classroom laboratories, there are expressed concerns by instructors over the inability of online students to participate in hands-on, traditional laboratory experimentation (Rivera, 2016). The relevant point to be evaluated is the engagement in face-to-face problem solving and scientific inquiry promote student self-efficacy and classroom community (Clary & Wandersee, 2010). The educational community recognizes the vast array of course offerings in universities lend to classes best suited for online education. Therefore, noted concerns are focused on laboratory-based degree programs, such as forensic science, biology, and chemistry, where "direct contact, immediate feedback, and tactile practice are the preferred method to ensure mastery" (Mgutshini, 2013; Rivera, 2016).

Based on the findings of research in online education, the expeditious advancement of online education has progressed for the convenience of the current generation of students. This progress has occurred with little hesitation to ponder the effect on the classroom learning environment or student cognitive retention and understanding (West & Veenstra, 2012). According to West and Veenstra (2012) the, "Elimination of traditional practical classes has occurred with relatively little consideration of the education impact of this change" (p. 57). Research has surmised the ability of the traditional classroom student to engage in hands-on experimentation produces elevated learning gains through the understanding of scientific processes, versus those students completing virtual labs at a distance (Fogg et al., 2013).

Thereby, these students may be better equipped to enter the workforce with in-depth knowledge and tactile application in their scientific field, while internalizing the self-confidence to complete required tasks.

Though the above stated concerns are warranted when evaluating the effectiveness of simulated tactile opportunities in the online classroom, in contrast, research has demonstrated noticeable learning gains and conceptual understanding in scientific processes in those students studying at a distance (Mawn, Carrico, Charuk, Stote, & Lawrence, 2011; Tatli & Ayas, 2011). Further, the research in online laboratory simulations concluded online experimentation provided a unique perspective, reinforcing the scientific method processes (Crippen et al., 2012; Tatli & Ayas, 2011). This suggests that online learning is comparable to traditional education in establishing foundational scientific inquiry and critical analysis. However, laboratory-based science coursework, health care programs, and mathematics have been recommended as not the ideal courses for online learning due to the necessity of immediate instructor feedback (Atchley, Wingenbach, & Akers, 2013). Therefore, consideration should be given to classes which are better suited for computer simulation and those, similar to crime scene investigation, animal dissection, and the manipulation of animal tissue, which warrant tactile experiences for authentic competency.

Additionally, exclusively replacing traditional labs with virtual may not provide students with an optimum learning opportunity (West & Veenstra, 2012). As Gioannis (2012) clearly states, “Digitization should not put an end to the physical presence” (p. 67). The more important focus should be scaffolding scientific theory with skill related science practices through the integration of well-designed virtual labs and practicum. Consequently, researchers are investigating methods to ensure pedagogical expectations are in line with technological

implementation in both traditional and online science disciplines (Lukaitis & Davey, 2010). Subsequently, it is important to first examine the modality and the outcomes existing within the traditional and online classrooms, as well as the self-efficacy, task value, and sense of community experienced within both settings. Limited research exists concerning the forensic science classroom, therefore, the focus of classroom orientation will remain in the varying scientific disciplines, traditional and online (virtual) science modalities.

Traditional Classrooms. Traditional classrooms are recognized as instructional learning completed entirely in a face-to-face encounter between instructor and student within a physical classroom (Rivera, 2016). Within the historical context of the traditional classroom, the historical construct for the science-based pedagogy is an instructor-focused lecture of key concepts, followed by lab practicum in collaborative student groups. Constructivist and theorist, John Dewey valued an authentic learning experience where teacher and student exchanged ideas in a face-to-face encounter (Fogg et al., 2013). Dewey describes this encounter as a concrete experience and is further recognized as something tangible and absolute (Kemp et al., 2014). Additionally, Vygotsky's Social Learning Theory reinforced the necessity of a hands-on physical encounter within the classroom between pupil, teacher, and community in producing authentic, cognitive learning amongst the participants (Moore, Dickson-Deane, & Galyen, 2011).

The mainstream, traditional classroom student is under the age of twenty-five and enrolled in undergraduate coursework (Swanke & Zeman, 2015). When reviewing academic outcomes within this age bracket, research has found there is a direct correlation between age and the scores received on projects and overall assessments. The older the student, the better their performance (Simonds & Brock, 2014). There appears to be a swing in these age demographics as research suggests there will be a 23% increase in nontraditional student

enrollment within the traditional learning environment over the next three years (Soares, 2013). This influx is attributed to adults desiring a career change or wanting to attempt a degree program they could not complete in their younger years (Soares, 2013). Additionally, the traditional, undergraduate residential student is expected to enroll in online coursework at some point in their college career due to the flexibility and multiple course offerings available.

This modality of study has demonstrated success in improving the students' conception of scientific facts, inspiring students to further inquiry, and enabling students to manipulate and apply the use of concrete laboratory equipment (West & Veenstra, 2012). In conjunction with these factors is the development of cooperation and sense of community, achieved when students collaborate to solve scientific problems in a laboratory setting (Frimming et al., 2013). DeWitt et al. (2013) characterized the effects of peer collaboration in scientific inquiry by stating, "Social interactions and dialogue internalizes learning" (p. 34). Students have also expressed their appreciation for immediate feedback from instructors, in addition to the students' ability to interpret verbal and non-verbal cues from the teacher. These factors contribute to the self-efficacy experienced by students enrolled in traditional, tangible laboratories (Buck et al., 2014).

Traditional Science Classroom Outcomes. As traditional, hands-on forensic investigation exercises, such as crime scene processing and collection of evidence, continue to decline in lieu of computer simulated exercises, research is needed to examine the outcomes of these changes on student self-efficacy, sense of collaborative problem solving, and overall comprehension of course material. The question of interest is centered upon, does the accessibility of virtual education authentically replicate the tangible nature of the traditional classroom? Further, does the online classroom allow the student to adequately master science application and processes, a necessary requirement for forensic science majors? The response to

this question is limited in published research concerning forensic science, but there exists documented analysis in other scientific disciplines.

Ross and Bell (2007) discovered a significant difference in assessments when examining students in traditional and online classroom formats. The students enrolled in the face-to-face course out performed those students in the fully online course. Notably, the traditional students demonstrated higher levels of application, analysis, and synthesis of complex information, though there was no significant difference in performance on rote knowledge. Coinciding with this research, West and Veenstra (2012) discovered 97% of physiology students preferred physical experimentation and were not in favor of completing the labs on computer simulations. The students recognized the importance of tangibly exploring animal tissue where collaboration and exploration with peers was permissible, versus in an artificial, disconnected environment (West & Veenstra, 2012). After participating in the computer simulated portion of the lab requirements (*PhysioEx*™ 6.0), these same students stated, "They learnt nothing from the computer simulations used" (p. 64). Not surprisingly, the students admitted the easy accessibility of online activities was appreciated and visually stimulating (West & Veenstra, 2012, p. 64).

Further comparison of traditional and online science coursework, conducted by Atchley et al. (2013), concluded a significant difference in traditional retention rates versus those students enrolled in comparable virtual coursework. Additionally, they found traditional students had higher completion rates (95.6%) when compared to online students (93.3%) (Atchley et al., 2013). Although higher education students prefer the flexibility and visual engagement of online learning, it is evident there are areas of science that require hands-on application.

It is important to note, a significant number of science major undergraduate students prefer the traditional, face-to-face, classroom environment (Ramlo, 2016). Research conducted by Ramlo (2016) discovered physics undergraduate students disliked online coursework so intently, "They would transfer to another college/university if their program of study became partially or completely online" (p. 492). The importance of the physical presence of the instructor is imperative (Ramlo, 2016). In addition, these students do not perceive the online, simulated laboratory assignments provided the same level of comprehension as the traditional, face-to-face experimentation (Ramlo, 2016). A number of science professors share this viewpoint and conclude that online coursework does not replicate an authentic learning experience or comparable pedagogy as experienced in the traditional classroom (Simsek, 2013).

Further research in faculty perception by Allen et al. (2016) concluded that only 29.1% of academic officers believed their faculty supported "the value and legitimacy of online education" when compared to the traditional, residential classroom (p. 6). This percentage demonstrates a continuing decline in university faculty support for increasing online course offerings (Allen et al., 2016). Therefore, as Lu and Lemonde (2013) theorized, academic performance may be correlated to the type of classroom modality. This suggests that a traditional, face-to-face classroom may be an effective learning environment for students requiring interactive, engaging, and more structured format.

Online Classrooms. Online educational research has reflected a steady, gradual increase in student enrollment of 30% per year across college degree programs (Klaus & Changchit, 2014). Additionally, 70% of universities in the United States offer students fully online degree programs (Johnson, 2015). Educational researchers and postsecondary administrators support the notion that the development of online education is the "future of higher education" (Atchley

et al., 2013, p. 105). While recognizing the importance of creating vibrant online coursework, academia should recognize those attributes that foster successful online students. Characteristics of the online learner include self-autonomy in learning, a desire for flexibility in scheduling, inherent motivation, and the need to engage in a variety of interactive technological mediums (Cigdem & Yildirim, 2014).

These online learners tend to be nontraditional students, over the age of twenty-five (Tilley, 2014). The non -traditional learner tends to perform above average in their coursework but are not as comfortable with the virtual environment as their counterparts, the traditional college student (Simonds & Brock, 2014; Swanke & Zeman, 2015). Additionally, the online, nontraditional students spend greater amounts of time in online discussion boards and log in frequently to their virtual blackboards (Simonds & Brock, 2014). Interestingly, the work-place experience of the nontraditional student has an inverse correlative effect on their course grades. Research has shown, the nontraditional student will often answer course assessments from work-place experience rather than giving the textbook answers. Regardless, the nontraditional student performs at higher levels, academically, than the traditional, residential student (Swanke & Zeman, 2015).

When considering the influx of student enrollment in online education, and the preferred learning style of the online student, examining this form of classroom modality is a priority for college administrators. A focus for approximately 63% of university administration has become to examine methods of practice which will bridge the disparity existing between the virtual classroom and hands-on application (Frimming et al., 2013). These methods of practice are identified as the mediums or tools used to create a platform on which distance learning can increase student self-efficacy with tactile manipulation of course materials, resources, and

experimental equipment. As Engeström (1999) outlined in his research regarding the Activity Theory, the virtual student constructs knowledge through engagement in technological interfaces, i.e. discussion boards, simulated online laboratories, and virtual dissections.

In contrast, it is important to recognize the university professors who do not support virtual science experimentation. The overarching theme amongst these members is the idea that technology dehumanizes the essence of education (Kemp et al., 2014). These members of higher education clearly recognized the benefits of hands-on manipulation of lab equipment and the collaboration occurring within the traditional classroom. Additionally, these educators recognize the value of immediate assessment and evaluation of student lab activities (Kemp et al., 2014). The rapid incorporation of online degree programs has initiated causes of concern. Kemp et al. (2014) stated, "In the last decade … teaching has been ripped from the realm of human endeavors and morphed into a technological leviathan that is slowly usurping the soul of the profession" (p. 4).

In contrast, the educational community would not be concise in stating that authentic cognitive learning is not measurable in the virtual classroom. Supporters of online education clearly state that the differences existing between traditional and online learning are the point of focus (Kemp et al., 2014). Multiple research studies have found no significant difference between traditional and online core knowledge on performance tests, suggesting online students acquire comparable amounts of information (Frimming et al., 2013; Halupa & Caldwell, 2015; Lu & Lemonde, 2013; Mgutshini, 2013). Further, virtual education provides students with access to insurmountable amounts of information, theories, and research, in addition to bridging the chasm of distance in learning (Kemp et al. 2014).

Considering online education will remain at the forefront of degree programs world-wide, it is important to examine student perceptions within this forum. By understanding how students visualize their individual success in forensic science classrooms, both traditional and online, educators gain a better understanding of effective pedagogy and practices. According to Mason, Helton, and Dziegielewski (2010), the primary goal of educational academia should be the implementation of effective instructional methods which provide an environment with active engagement, at a distance, in which student sense of connection and mastery are attainable.

Therefore, it is important to examine why online students are attracted to this form of modality and to compare perceptions and learning gains between traditional and online classrooms. Online education uniquely offers students the flexibility to complete college coursework on their personal time frame, while providing reduced educational expenditures (Fletcher, 2013). However, the benefits of participating in the traditional science classroom versus the virtual classroom provide the tactile mastery only available through hands-on application in science courses (Mawn et al., 2011). Considering the field of forensic science, with an emphasis on tactile processes and mastery, there is apprehension regarding a fully online curriculum and experimentation provided students (Kemp et al., 2014).

Online Science Classroom Outcomes. Online student outcomes have demonstrated measurable learning gains in educational research. These outcomes are noticeable within student academic performance, cognitive comprehension of scientific principles, and successful completion of online laboratories. Musawi, Ambusaidi, Musct, and Al-Balushi (2015) identified traditional and online science-based coursework where students demonstrated comparable learning gains in their virtual simulations. Additionally, proportionate student achievement in both traditional and online virtual experimentation, was measured by Potkonjak, Jovanovic,

Holland, and Uhomoibhi (2013). Tatli and Ayas (2011) observed students engaging in online experimentation. These students appreciated the freedom to repeat virtual experimentation, not only to ensure replication of results, but to have the ability to resubmit laboratories when conclusions are skewed. Virtual labs also provided students the opportunity to further understand the laboratory methodology by engaging in repetitive experimentation (Tatli & Ayas, 2011). The majority of these students claimed that replication increased cognitive understanding (Tatli & Ayas, 2011).

Mgutshini (2013), when comparing the class averages of nursing students in both the traditional and online modalities, identified increased cumulative class averages in the online students (87% versus to the 81% of the traditional students). Additional research conclusions, similar to these studies, demonstrate the overall effectiveness of online education in establishing concrete understanding of core knowledge across the scientific disciplines. Chemistry coursework is exploring with progressive online experimentation, in conjunction with supplemental resources. Tatli and Ayas (2011) examined ninety chemistry students who were required to complete virtual chemistry laboratories (VCL) as part of their coursework. The results indicated that the virtual experimentation was equivalent too traditional, hands-on labs in developing the scientific method. The results provided further insight into the benefits of repeated experimentation, collaboration toward problem solving, and the positive effect on student learning.

Anatomy science programs have examined the use of human anatomy virtual software, Pearson Education PAL 2.0, which provides a 2D and 3D anatomical animations for traditional and online students (Kuyatt & Baker, 2014). Kuyatt and Baker (2014) utilized the Perceived Learning Scale to examine the students perceived “cognitive, affective, and psychomotor

learning" when utilizing this software within traditional and online human anatomy and physiology course (p. 14). The researchers discovered a statistically significant increase in online students perceived learning scores when compared to the traditional class. The researchers concluded, "Online hybrid students can learn as much or more about human anatomy than FTF (face-to-face) students" (Kuyatt & Baker, 2014, p. 18).

Geological sciences require detailed knowledge of earth's processes and landscapes. To provide this level of knowledge to the virtual classroom, implementation of virtual mapping software, via Google Earth, has the ability to scaffold field experience and online learning (Clary & Wandersee, 2010; Sandy & Franco, 2014). Positive reactions by online students participating in the study included the ability to study remote locations which may have been unattainable, factual photographs, and topography via Google Earth technology. Further, students were exposed to a variety of geologic processes. Clary and Wandersee (2010) concluded the implementation of the virtual mapping software in the online classroom provided a proportional classroom experience to that of traditional geology pedagogy. Research conducted by Sandy and Franco (2014) explored the sense of presence experienced in online geology students while using virtual mapping software. A summary of the analysis concluded that participation in online coursework creates a "visceral sense of what a place is like through virtual, rather than actual, interaction" (Sandy & Franco, 2014, p. 208).

The above-mentioned scientific disciplines have clearly benefited from online resources and technological platforms which supplement course curriculum. But within the field of forensic science, little research is available that provides insight into online post-secondary forensic programs or student reflection on the effectiveness of these programs. There are no studies which have examined student confidence levels, task value, and sense of community in

the traditional and online forensic science course. Research is needed to explore student belief in the effectiveness and applicability of coursework when comparing the traditional and online forensic science experience.

Why Forensic Science?

The discipline of forensic science applies the knowledge and methodology surrounding criminal investigation, in addition to the resolution of these issues, within the judicial court system (Ubelaker, 2013). The field of forensic science has witnessed a dramatic increase in student interest and enrollment since the 1990's (The Economist, 2010). This increase is largely attributed to the sensationalism of this scientific field through forensic oriented television programs and media dramatization (The Economist, 2010). This phenomenon, called the CSI effect, is defined as the belief that every crime scene contains crucial evidence, primarily DNA evidence, and that the prosecutor should always be able to produce this evidence in court (Saferstein, 2016). In addition, the CSI effect has propagated an increased attraction to the glamor of a forensic investigator and the feelings of accomplishment and self-worth attained when engaging in criminal investigation and when contributing to the resolution of a crime (Jerpi, 2011). Additionally, the CSI effect has sparked interest in forensic science programs, in both high school and university programs, through increased demand for course offerings and supporting laboratory practice (Jerpi, 2011).

Coinciding with increased interest level is the request for forensic science graduates by local, state, and federal government agencies (Forensic Science Center, 2016). This demand is largely attributed to the increased interest in DNA evidence and the backlogs associated with testing this form of evidence (Forensic Science Center, 2016). Police agencies prefer those students who have majored in biology or chemistry coursework, in addition to forensic science

programs. Researchers anticipate a 27% increase in available forensic science positions between 2014 and 2024 (Forensic Colleges, 2016).

The field of forensic science incorporates multiple scientific disciplines: biology, chemistry, physics, mathematics, odontology, anthropology, zoology, geology, and many more (Babcock & Warny, 2014). The science also incorporates higher order thinking due to the primary duties expected of a forensic specialist: analyzing and collecting physical evidence at crime scenes, synthesis of complex information and expert testimony of relevant laboratory results (Lehman, 2012). The criminalistics duties require extensive training and practice of proper techniques of identification, collection, packaging, and labeling of physical evidence (Saferstein, 2016). According to Ubelaker (2013), forensic procedures "call for broad understanding of the underlying science and full awareness of the appropriate available techniques, technology and databases, as well as limitations" (p 1). Failure of a forensic investigator to adhere to agency protocol, policies, and procedures can result in the elimination of physical evidence and the circumvention of investigation (Saferstein, 2016). Therefore, it is important to recognize these duties are tangible in nature, requiring hands-on, conceptual understanding of proper procedures and logistics involved in criminal investigation.

The academic course offerings in the discipline of forensic science are relatively new, beginning in the twentieth century (McCay, 2014). Therefore, there has not been extensive study in this field regarding student sense of mastery and community in both the traditional and online classroom formats. Due to the demand for forensic science course offerings, in conjunction with the continual increase in online education, research is needed in discerning the self-efficacy, task value, sense of community, and overall skill mastery of forensic science virtual students when

compared to participation in the traditional, face-to-face classrooms. The research on this topic is minimal, verifying the need for further insight into this scientific field.

Criminal Investigation Course. An applicable course to study student self-efficacy, task value, and sense of community is within a criminal investigations course, where a percentage of the requirements are tactile in nature. Course requirements and expectations can include an understanding of the procedure for processing a crime scene, proper collection methods for the search of trace evidence, and identification and procurement of latent fingerprints. Additionally, a criminal investigation course provides students with the opportunity to learn about proper surveillance techniques, methods of interrogation, and evidence preservation (Osterburg & Ward, 2013). These skills require tangible, first-hand knowledge of methodology and application, both of which are simulated within the traditional and online criminal investigation classroom through evaluation, analysis, and synthesis.

The course syllabus for both the traditional and online classrooms are comparable in nature, though not exact. The traditional course learning outcomes are as follows:

- To learn logical methods of conducting criminal investigations of specific crimes, through the use of modern techniques from the fields of medicine, forensic science, and psychology.
- To learn how successful criminal investigations are conducted in the U.S. within the confines of the Constitution.
- Recognizing and identifying physical evidence-taking physical evidence and acquiring appropriate exemplars, striations and altering contrast.
- Recognizing how guilt is determined in each crime.
- Know the 4 objectives to an interrogation.

- Know the elements that trigger the administration of one's Miranda Warnings
- Distinguish how an offender's Modus Operandi effects an investigation

The learning outcomes for the online CJUS420 course are as follows:

- Describe specific legal concepts in relation to criminal investigations.
- Identify the proper steps of crime scene processing.
- Evaluate the methods of appropriate evidence preservation for specific forensic analysis.
- Summarize methods of obtaining information from witnesses and databases.
- Explain the appropriate utilization of confidential informants during a criminal investigation.
- Explain specific physical and electronic surveillance techniques.
- Understand the logical steps utilized to obtain a confession during an interrogation.
- Explain the logical process of conducting a criminal investigation within the confines of the U.S. Constitution.
- Integrate biblical principles into the ethical decision-making process.

The assessments are almost identical, consisting of research paper and exams.

Self-efficacy

Self-efficacy is a measurable variable which has been utilized throughout research to identify student confidence levels in relation to their academic coursework. Self-efficacy is defined as the confidence or belief an individual feel about themselves as being capable of meeting expectation (Pintrich et al., 1991). Examining measures of student self-efficacy is important because levels of self-efficacy influence motivation, beliefs about learning, and overall

performance (Alt, 2015). Additionally, student self-efficacy requires acceptance of the self-regulation of their learning environment and is capable of providing a direct relationship to both physical and psychological capabilities in academic expectations (Alt, 2015). Motivational research conducted by Johnson et al. (2014) relayed that self-efficacy is one of the strongest predictors of academic achievement. Self-efficacy also has a direct relationship to attrition rates in undergraduate coursework (Alt, 2015). It is therefore important to examine levels of self-efficacy within the forensic science traditional and online classrooms.

Research in measuring self-efficacy has been performed in both the traditional and online classroom. Support for the development of self-efficacy in the traditional, face-to-face laboratory was conducted by Brownell, Kloser, Fukami, and Shavelson (2012) where analysis showed these students felt connected to their professor and confident in their mastery of skills. The ability to engage in immediate face-to-face feedback and class discussion reinforces laboratory policies and procedures (Brownell et al., 2012). When analyzing the ability to raise self-efficacy in African American females in a general science classroom, Buck et al. (2014) discovered when the teacher encourages question and answer periods during the experimentation, as well as re-experimentation when unsuccessful, self-efficacy in the students increased. The female students also claimed the hands-on lab experimentation, in conjunction with a lab teacher, aided in increasing their confidence in the scientific method. This suggests students with low confidence in scientific processes require face-to-face reinforcement and tangible processes to feel successful in their cognitive understanding.

Additionally, nursing students, in both online and traditional classrooms, scored their self-efficacy at the end of a course (Mgutshini, 2013). The courses were taught by the same instructor with comparable course content. The research by Mgutshini (2013) concluded the

face-to-face students reported a 72% perceived proficiency compared to the 64% in the online students. This perception of content mastery is potentially correlated to the inability to discuss course content in an open forum between peers and instructor. Online students also recorded less confidence, self-efficacy, in their mastery of course content, although online students scored higher on the performance tests (Mgutshini, 2013). Therefore, students enrolled in the traditional science classroom appear to perceive higher levels of confidence in their abilities than those studying at a distance.

In contrast, Barnard-Brak, Lan, and Paton (2010), online students exhibited higher mean scores for GPA (grade point average) than the general population of college students due to an inherent desire for academic achievement. This suggest that online students may experience higher levels of self-efficacy when motivated. Research conducted by Taipjutorus, Hanson, and Brown (2012) found high levels of self-efficacy in online students which also correlated to high levels of learner control. Thereby, providing insight to elevated levels of confidence when students perceive control of their online learning environment. Student self-efficacy has been linked to intrinsic and extrinsic motivation, as variables effecting students' motivation in the online classroom (Mubeen & Reed, 2014; Naidu, 2014). When intrinsically motivated, students perceive their learning as valuable and exhibit confidence and determination toward completion of coursework (Mubeen & Reed, 2014). Extrinsic motivation is more tangible in nature and could include words of praise, recognition and/or forms of rewards (Mubeen & Reed, 2014). Implementing these variables into online classrooms may spark motivation in students, ultimately increasing their self-efficacy.

Social learning environments also influence self-efficacy levels (Alt, 2015). Increased levels of self-efficacy have been correlated to the constructivist learning classroom, where

students are encouraged to collaborate through problem solving (Alt, 2015). Implementing communities of practice models also encourages those students in "peripheral participation", observational bystanders, to full participation through the development of self-confidence in "academic and social skills" (Gauthier, 2016, p. 7). Additionally, classroom communities within science education foster motivation, sense of accomplishment, and further support the students' perception of value in course content (Mubeen & Reid, 2014).

Task Value

Task value is defined by Johnson et al. (2014) as the personal justifications for students participating in a specific course task, in addition to the student expectations for task outcomes. Recognizing task value has the potential to result in a form of intrinsic worth (Johnson et al., 2014). Pintrich et al. (1991), pioneers in the measurement of student task value, describe task value as "how interesting, how important, and how useful the task is" (p. 11). The task, or academic course, will manifests into something of value for future coursework, careers, or personal aspirations throughout the semester.

Task value, similar to self-efficacy, is directly correlated to student motivation and performance (Lawanto, Santoso, Goodridge, & Lawanto, 2014). The greater feeling of motivation toward a task, largely attributed to value, will lead to a greater recognized need for the task mastery. These two perceptions result in the students' ultimately expectation to master a task (Johnson et al., 2014). Research has discovered task value is often related to the self-efficacy and academic performance of a student (Lawanto et al., 2014). Therefore, students with high measures of task value are more involved in their learning, dedicated to course completion, and perceive themselves as competent in academic content (Pintrich et al., 1991).

Sense of Community

Sense of community is defined as a sense of belonging to a larger group. This larger group may include student peers, local community, university faculty and staff, or religious affiliations. Developing a learning community within all classroom modalities promotes attrition rates, student satisfaction, and overall achievement (Kauffman, 2015). Fostering communities of practice is often an effective mechanism to nurture sense of community within traditional and online classrooms (Erdogan, 2016). Members of a classroom community experience "strong feelings of connectedness", sense of belonging, and peer/instructor support (Rovai, 2002).

Proponents of the traditional classroom believe online education will never be able to replicate the sense of community created within the traditional, face-to-face learning environment (Kemp et al., 2014). Face-to-face interaction creates a sense of community which fosters collaboration and problem solving, essential skills in the field of forensic science (Holmgreen, 2015). Developing a mentor-oriented relationship with peers is often easier to achieve in a physical encounter, rather than virtual. Even within online coursework, face-to-face encounters via Facebook, Skype, or other forms of social media result in increased levels of community (Ekoc, 2014). Additionally, on-campus coursework promotes student connection with the mediation tools between content and learning, characteristic of Activity Theory (Holmgreen, 2015).

In contrast, there is also evidence to support the development learning communities in online education is feasible and productive (Erdogan, 2016). Sense of community in the virtual classroom is recognized as a feeling of connectedness to the university, peers, and instructors at a distance (Rovai, 2002). Rovai (2002) describes four essential variables, or domains, that are necessary for online students to feel connected to their classroom: spirit, interaction, trust, and learning. It is through meaningful discussion within a secure environment that authentic learning

is capable of thriving (Schroeder et al., 2016). These can be difficult concepts to foster in the online classroom, as many students experience disconnectedness due to the reality of distance learning (Cho, Hathcoat, Bridges, Mathew, and Bang, 2014; Rovai, 2002). Feelings of separation from the learning community are believed to contribute to the lower rates of attrition in online education, coinciding with the inability to develop self-regulated learning skills required for success (Barnard-Brak et al., 2010).

Rather than a sense of disconnectedness, online students desire a social presence in the virtual classroom. Similar to Rovai (2002) characteristics reflected in sense of community, social presence is correlated to three variables: immediacy, authenticity, and intimacy (Schroeder et al., 2016). Immediacy is influenced by the verbal and nonverbal communication present in the online environment (Schroeder et al., 2016). Authenticity is a psychological construct manifested through "personal disclosure and the expression of genuine self" (Schroeder et al., 2016, p. 246). The final variable, intimacy, is the achievement of a feeling of connectedness in the online class, the pinnacle of social presence (Schroeder et al, 2016).

Therefore, the key to success in developing sense of community in online education is described as the meaningful interaction and discussions occurring among the students (Jain, Jain, & Jain, 2011; Phirangee, Epp, & Hewitt, 2016). Vygotsky's Social Learning Theory, in addition to Activity Theory, promote the concept of construction of knowledge through social interaction with peers (Rovai & Gallien, 2005). Lewis, McVay-Dyche, & Chen (2015) supported the importance of peer interaction in the construction of knowledge when studying online medical students. Their research concluded, "Courses that embed the requirements for peer-to-peer interaction, frequent feedback, and instructor-to-student communication are perceived to have a

greater sense of community" (Lewis et al., 2015, p. 17). This interaction is foundational in the development of collaborative problem-solving skills, essential to the field of forensic science.

Educational institutions now recognize that online students perform better when they connected to their curriculum, peers, and institution, which subsequently effects student levels of satisfaction with their course work and overall course performance (Naidu, 2014). Developing a sense of connectedness, or community, within the virtual classroom has risen to the forefront of educational institution concerns due to the lower attrition rates in online students (Schroeder et al., 2016). Research has discovered that instructor support has been found to be directly correlated to increasing student sense of connectedness to their online course (Phirangee et al., 2016). Analysis of this topic conducted by Phirangee et al. (2016) discovered that students enrolled in an online course demonstrated significantly higher levels of sense of community when the course was led by an instructor who appeared to be genuinely concerned about the welfare of the students. Additionally, these same students expressed a greater sense of community when the online instructor participated in the online discussion topics and engaged in frequent communication (Phirangee et al., 2016).

Summary

Scaffolding scientific practices and theory toward authentic learning reflects the primary goals of the science educational community, in both traditional and online classrooms. To ensure the success of this goal requires well-developed experimentation opportunities, lab experiences, and virtual simulations. These interactive tools enable both traditional and online students to bridge the enduring understandings introduced in science coursework to levels of self-confidence in knowledge and task value in the information acquired through active engagement in coursework. Holmgreen (2015) suggested the tools of learning are the

connections between the activity and tangible practice. Considering the traditional classroom is effective in providing tangible, hands-on experiences that produce authentic learning experiences (West & Veenstra, 2012), it is important to analyze the ability of online technological interaction and supplemental resources in achieving this same goal. Primarily due to this form of technological interaction is the preferred method of learning in the current generation of students.

As student demand for online science degree programs continues to escalate, innovation for virtual science coursework will remain at the forefront of the educational community (Potkonjak et al., 2013). While research varies on the ability of online science course experience to prepare students for skill-based expectations, research is needed to determine the most effective avenues to adequately equip the techno-savvy student (Kemp et al., 2014). Regardless of classroom format, an ideal learning environment is where the learner is equipped to construct meaning between theory and practice, form scientific processes, receive immediate feedback, utilize technology, and develop a sense of confidence in their overall ability.

Considering the field of forensic science is a relatively new academic program in universities, little research exists on student perception of traditional and online pedagogy. A forensic science criminal investigation course provides a unique opportunity to measure student perception of their learning experience. Considering the increase in forensic science course offerings throughout educational institutions, research is needed to examine student self-efficacy, task value, and sense of community in this discipline. By analyzing student perception in these areas, the educational community has the potential to increase student's confidence levels and feelings of connectedness, which will provide forensic science students with the necessary skills required on the investigative field.

CHAPTER THREE: METHODS

Overview

This chapter identifies the research design, participants, classroom setting, instrumentation, procedures, and statistical analysis that was used in this study. This research study utilized a quasi-experimental nonequivalent group design to determine if there was a statistically significant difference in self-efficacy, task value, and sense of community in undergraduate students enrolled in a criminal investigation course in comparable traditional and online classrooms. This chapter also includes the definition of the independent and dependent variables, in addition to validity support for testing instruments.

Design

The research design is a quasi-experimental static group comparison design. This design was selected due to the preassigned, cluster groups of students and includes pretest/posttest measurements (Gall et al., 2007). According to Warner (2008) this is the appropriate design to effectively analyze groups that have received different treatments or are grouped separately. In addition, this is the appropriate design when randomization is not possible (Çakiroglu, 2014). This study investigated the dependent variables (self-efficacy, task value, and sense of community) in students enrolled in the independent variables (traditional or online) forensic science criminal investigation course.

Research Questions

RQ1: Is there a statistically significant difference in forensic science criminal investigation students' self-efficacy dependent on the type of modality (traditional and online) enrolled?

RQ2: Is there a statistically significant difference in forensic science criminal investigation students' task value dependent on the type of modality (traditional and online) enrolled?

RQ3: Is there a statistically significant difference in forensic science criminal investigation students' sense of community dependent on type of modality (traditional and online) enrolled?

Hypotheses

The null hypotheses for this study are:

$H_0$1: There is no statistically significant difference in self-efficacy for forensic science Criminal Investigation students based on the type of classroom modality (traditional and online) when measured by the *Motivated Strategies for Learning Questionnaire (MSLQ) Self-efficacy subscale*.

$H_0$2: There is no statistically significant difference in task value for forensic science Criminal Investigation students based on the type of classroom modality (traditional and online) when measured by the *Motivated Strategies for Learning Questionnaire (MSLQ) Task Value subscale*.

$H_0$3: There is no statistically significant difference in sense of community for forensic science Criminal Investigation students based on the type of classroom modality (traditional and online) when measured by the *Classroom Community Scale (CCS)*.

Participants and Setting

The population studied in this research included 67 undergraduate forensic science students enrolled in a criminal investigation course for the fall (2017) and spring (2018) semesters at a suburban university. This large, private university was estimated to enroll 40

residential and 180 online students in the fall (2017) and spring (2018) semesters. The population self-selected their type of classroom modality by registering either as a traditional, on-campus, or online student, therefore randomization was not possible. The majority of the students enrolled in the course were classified as seniors.

Participants. Undergraduate students ($N = 67$) participating in this research were registered in one of two modalities, traditional ($n = 41$) or online classroom ($n = 26$) in a large, private university. This size sample ($N = 67$) exceeds the required minimum (48-62 participants) for medium effect size, statistical power of .7 at the .05 alpha level, when using a MANOVA (Warner, 2008). To identify the students age bracket, the traditional student was classified as under the age of twenty-five, while a nontraditional student was considered over the age of twenty-five. This was based on research by Swanke and Zeman (2015) and was integrated within the survey instrument. The survey results indicated that 65% of the students were traditional students or under the age of twenty-five years, while 35% of the participants were non-traditional or over the age of twenty-five. The ethnic composition of the sample ($N = 67$) is 78 % Caucasian, 12 % African-American, 8 % Hispanic, 1 % Pacific Islander, and 1 % preferred not to answer.

Setting. The Criminal Investigations course is a required course for graduation in both the Bachelor of Arts and Bachelor of Science degrees in criminal justice related fields. The Criminal Investigation course is a 400-level course and is primarily comprised of juniors and senior level students. Within the sample for this research, 25 % of the students were classified as juniors and 75 % of the participants were seniors. The traditional, on-campus course was a full semester course (14 weeks) and was surveyed twice during the semester (pre and post surveys). The online courses were divided into two sub-terms (B and D) of 8 weeks. Each online course

was surveyed two times (pre and post surveys). Both courses followed similar course descriptions. The course requirements, syllabus (Appendix P & Q), and course expectations are comparable in both classroom modalities, traditional and online. The course provided students with an overview of the basic principles required for criminal investigation: constitutional laws and guidelines, effective techniques for processing crime scenes, and the process for the collection of evidence. The traditional, on-campus course was recognized as a class completed in the physical, brick-n-mortar classroom, which involved face-to-face interaction between instructor and students, in addition to peer collaboration. The online course was considered completely virtual, with 100% of the course work accessed at a distance via a blackboard platform.

Instrumentation

The *Motivated Strategies for Learning Questionnaire (MSLQ),* developed by Pintrich, Smith, Garcia, and McKeachie (1991), was used to measure students' self-efficacy and task value in both the traditional and online classrooms. In addition to the *MSLQ*, the *Classroom Community Scale (CCS)*, developed by Rovai (2002), measured students' sense of community in both classroom modalities: traditional and online. The expected rate of return was approximately 43% according to recent research of online student surveys (Chapman & Joines, 2017).

MSLQ. The *MSLQ* was designed by Pintrich et al. (1991) to measure levels of orientation in motivation and learning strategies in college students, in addition to the effect courses have on students. The design of the *MSLQ*, founded upon social-cognitive theories, accounts for the individual students' ability to actively process knowledge and adapt that knowledge to motivational strategies (Duncan & McKeachie, 2005). The complete *MSLQ* contains two sections: motivations and learning strategies. The motivation section contains 31

items designed to measure what students believe about the skills attained in a college course, in addition to their individual goals and values. The learning strategies section contains 31 items evaluating a student's cognitive and metacognitive strategies, in conjunction with a 19-item section covering student management (Pintrich et al., 1991). The entire survey requires between twenty and thirty minutes to complete (Duncan & McKeachie, 2005). The *MSLQ* was designed to be used in the complete form, or singly, allowing researchers to utilize the questionnaire as needed (Duncan & Mckeachie, 2005). Therefore, the *MSLQ Self-efficacy for Learning and Performance subscale* was used to measure students perceived levels of confidence in both the traditional and online classrooms and *MSLQ Task Value subscale* was used to measure students view on the significance and overall value of course components (Pintrich et al., 1991).

Self-efficacy. The *MSLQ Self-efficacy for Learning and Performance subscale* (Appendix O) evaluates students on two levels: expectancy for success and self-efficacy. Expectancy for success is defined by Pintrich et al. (1993) as the expectations in one's task performance. Pintrich et al. (1993) describes the measure of self-efficacy as the ability of the student to effectively complete and master a specific task, while considering personal judgment and confidence levels. This subscale includes eight items (5, 6, 12, 15, 20, 21, 29, 31) on a seven-point Likert Scale (Pintrich et al., 1993). The seven-point Likert Scale ranges from (1) "not at all true of me" to (7) "very true of me" (Pintrich et al., 1993, p. 5). The scale has a Cronbach's coefficient of $\alpha = .93$, for task value (Pintrich et al., 1993).

Task Value. The *MSLQ Task Value subscale* (Appendix O) evaluates the student perceptions on the importance of course materials to course goals and related value in the overall learning experience (Pintrich et al., 1993). Increased task value is associated with higher levels of learning. This subscale includes six items (4, 10, 17, 23, 26, 27) on a seven-point Likert Scale

(Pintrich et al., 1993). The seven-point Likert Scale ranges from (1) "not at all true of me" to (7) "very true of me" (Pintrich et al., 1993, p. 5). The scale has a Cronbach's coefficient of $\alpha = .90$, for task value (Pintrich et al., 1993).

CCS. The *Classroom Community Scale* was developed by Rovai (2002) to "measure the sense of community in a learning environment" (p. 197). Community is described as a sense of belonging to a larger group, purpose, or calling. Examples include scholastic and religious affiliations, thematic non-profits, or related goal aspirations. Therefore, due to related interests, students experience connectedness to peers involved in similar activities, enrolled in similar coursework, and categorized in comparable degree programs. The *CCS* is a twenty question, self-report survey on a five-point Likert Scale, with the following responses: strongly agree, agree, neutral, disagree, and strongly disagree (Rovai, 2002). The score range for the twenty questions is 0-80. The *CCS* has a Cronbach's coefficient of $\alpha = .92$ for connectedness (Rovai, 2002). A high score reflects higher feelings of connectedness and community (Rovai, 2002).

Descriptive Statistics. To gather descriptive statistic information, the students were asked for their gender, ethnicity, age range (Younger: < 25 years or Older: > 25 years), classification (freshman, sophomore, junior, or senior), and the number of courses completed online. These questions were provided on the pretest survey, via SoGoSurvey, administered week one of the traditional and online courses through an email web-link.

Procedures

Upon gaining permission from the Institutional Review Board (IRB) at Liberty University, this researcher initiated the research study. The Helms School of Government was contacted in regard to the implementation of the research surveys in early fall 2017 semester. The pretests for both the online criminal investigation classes were delivered to the dean of the

department one month prior to the first week of the 2017-2018 fall semester. The traditional full-term courses and 8-week online sub-terms pre-course surveys for the spring 2018 semester were delivered to the dean of the Helms School of Government one month prior to implementation. The dean of the Helms School of Government added the survey to the class sections. The one complete survey instrument was comprised of the *MSLQ* (self-efficacy and task value sub-scales) and the *CCS* survey, in addition to demographic information. The students in the 8-week courses were allowed one week to complete the pretest and the 14-week traditional classroom students were allowed two weeks. An outline (Appendix E & L) of instructions on administering the web link for the pretest survey was provided for the traditional and online instructors. The pretest included the *MSLQ Self-efficacy for Learning and Performance* subscale, the *MSLQ Task Value* subscale, and the *CCS*. Students were asked demographic questions: gender, ethnicity, age, classification (freshman, sophomore, junior, or senior), and the number of courses completed online. The surveys were administered, via URL, to SoGoSurvey domain where they were created in an online format. Upon student completion of the online surveys, the researcher gathered the data for analysis.

The posttests for both the traditional and online criminal investigation course were prepared for delivery week twelve of the traditional course (spring 2018) and week seven of the online course in the fall (2017 D term) and spring (2018 B and D term) semesters. The students enrolled in the traditional classroom were permitted two weeks to complete the survey, and the students enrolled in the online classroom received one week to complete the survey. Instructions and procedure provided during the pretest were given to instructors for the posttest and included the URL to SoGoSurvey.

Data Analysis

After acquiring the data results from both the pretest and posttest surveys, SPSS was used to calculate the descriptive statistics to describe the sample. The sample size, mean, and standard deviation was calculated by classroom modality (traditional and online). A MANOVA was utilized to determine if there was a significant difference between the independent variable classroom modality (traditional and online) and the dependent variables (self-efficacy, task value, and sense of community). A MANOVA test was chosen for the analysis due to its ability to measure multiple quantitative variables across two or more static groups (Warner, 2008).

Several assumption tests were generated to test for tenability of the data. SPSS software was utilized to generate the assumption testing. To test for the assumption of extreme outliers, box plots were generated for the dependent variables (self-efficacy, task value, and sense of community) when analyzed to the type of classroom modality (traditional or online) (Figure 7). To test for the assumptions of univariate normality, histograms were generated (Figure 4-6). To test for the assumption of multivariate normality, a Mahalanobis distance was generated. To the test for the assumption of linearity, a Q-Plot was generated (Figure 8-10). To test for the assumption of equal variances, Levene's Test for Equality of Variance was generated. To test for the assumption of homogeneity of variance-covariance, Box's M was generated. Measures of central tendency were computed by SPSS to summarize the statistical information for the independent variables, type of classroom modality (traditional and online) and the dependent variables (self-efficacy, task value, and sense of community). An ANOVA test was generated using SPSS software for each dependent variable (self-efficacy, task value, and sense of community) to test whether there was a statistically significant difference between classroom modality (traditional and online) and the dependent variables. The covariate for the analysis was the pretest. ANOVA testing is the best test when randomization is not possible and to control for

the differences between the groups (Gall, Gall, & Borg, 2007). These differences include age, gender, ethnicity, and academic classification.

CHAPTER FOUR: FINDINGS

Overview

A quasi-experimental static group comparison design was used to examine if there was a statistically significant difference in self-efficacy, task value, and sense of community in undergraduate students enrolled in a criminal investigation course (CJUS 420) in both the traditional and online classrooms. The anonymous survey data was gathered throughout the fall 2017 and spring 2018 terms. The data was analyzed using a MANOVA statistical test, which is best the test to analyze one independent variable on two levels (traditional and online) on three dependent variables (self-efficacy, task value, and sense of community). Chapter five will discuss the findings and interpretation of the statistical data.

Research Questions

RQ1: Is there a statistically significant difference in forensic science criminal investigation students' self-efficacy dependent on the type of modality (traditional and online) enrolled?

RQ2: Is there a statistically significant difference in forensic science criminal investigation students' task value dependent on the type of modality (traditional and online) enrolled?

RQ3: Is there a statistically significant difference in forensic science criminal investigation students' sense of community dependent on type of modality (traditional and online) enrolled?

Null Hypotheses

$H_0$1: There is no statistically significant difference in self-efficacy for forensic science Criminal Investigation students based on the type of classroom modality (traditional and online)

when measured by the *Motivated Strategies for Learning Questionnaire (MSLQ) Self-efficacy subscale*.

$H_0$2: There is no statistically significant difference in task value for forensic science Criminal Investigation students based on the type of classroom modality (traditional and online) when measured by the *Motivated Strategies for Learning Questionnaire (MSLQ) Task Value subscale*.

$H_0$3: There is no statistically significant difference in sense of community for forensic science Criminal Investigation students based on the type of classroom modality (traditional and online) when measured by the *Classroom Community Scale (CCS)*.

Descriptive Statistics

An anonymous online self-report survey was utilized to gather the research data. The self-report survey was comprised of Likert type scales on the combined testing instruments, the *Motivated Strategies for Learning Questionnaire (MSLQ) Self-efficacy and Task Value subscales* and *Classroom Community Scale (CCS)*. The *MSLQ* has a Cronbach's Alpha for self-efficacy of $\alpha = .93$. The *MSLQ* task value subscale has a Cronbach's Alpha of $\alpha = .90$. The *CCS* has a Cronbach's Alpha of $\alpha = .93$. These demonstrate the high validity and reliability of the testing instruments (Pintrich et al., 1991; Rovai, 2002).

Demographics. The total number of respondents which completed the online survey was $N = 67$. The 67 respondents were comprised of 49% males ($N = 33$) and 51% female ($N = 34$) undergraduate students. The ethnic composition of the sample (N = 67) is 78 % Caucasian, 12 % African-American, 8 % Hispanic, 1 % Pacific Islander, and 1 % preferred not to answer. Of the total respondents, 64% were considered traditional college students, as they are under the age of 25 years ($N = 43$) while 34% were non-traditional students over the age of 25 years ($N = 23$), and

2% chose not to answer the question about age. Of the total respondents, 25% of the students identified as juniors ($N = 17$) in college, while 75% stated they were seniors ($N = 50$). There were no reported freshman or sophomore students. Table 1 provides the disaggregated data for gender, ethnicity, age, and class rank.

Table 1

Demographics: Gender, Ethnicity, Age, and Class Rank (N = 67)

Variable	Category	Frequency	Percentage of Total
Gender	Male	33	49
	Female	34	51
Ethnicity	White/Caucasian	52	78
	African American	8	12
	Hispanic	5	8
	Pacific Islander	1	1
	Other	1	1
Age	<25 years	43	64
	>25 years	23	34
	Prefer not to answer	1	2
Class Rank	Junior	17	25
	Senior	50	75

Results

The *MSLQ* subscales, self-efficacy and task value, have a range of 1 to 7 on a 7-point Likert scale. Higher scores represent greater levels of self-efficacy and task value. The self-efficacy subscale had an overall mean of 5.80 ($N = 67$, $SD = 0.94$). The overall sample size ($N = 67$) was represented by two subgroups, the traditional classroom ($n = 41$) and the online classroom ($n = 26$). The students in the traditional classroom had a mean of 5.72 ($n = 41$, $SD = 0.82$) and the online classroom had a mean of 5.93 ($n = 26$, $SD = 1.10$) for self-efficacy. The task value subscale had an overall mean of 6.08 ($N = 67$, $SD = 1.05$). The students in the

traditional classroom had a mean of 6.01 (n = 41, SD = 1.06) and the online classroom had a mean of 6.19 (n = 26, SD = 1.04) for task value.

CCS (Classroom Community Scale) has an overall range of 0-80 on a 5-point Likert scale. The *CCS* had an overall mean of 19.60 (N = 67, SD = 5.84). The *CCS* mean for the traditional classroom was 43.49 (n = 41, SD = 4.44) and the online classroom mean was 30.58 (n= 26, SD = 14.62). The *CCS* is comprised of two subscales (learning and connectedness) which range in scores of 0-40. The learning subscale had an overall mean of 18.94 (N = 67, SD = 6.64). The connectedness subscale had an overall mean of 19.60 (N = 67, SD = 5.84). Descriptive statistics, disaggregated by classroom medium, are shown in Table 2.

Table 2

Descriptive Statistics on Dependent Variables Disaggregated by Classroom Medium (N=67)

	Traditional (n = 41)			Online (n = 26)		
Measure	*M*	*SD*	95% CI	*M*	*SD*	95% CI
Self-efficacy	5.72	0.82	[5.43, 6.02]	5.93	1.10	[5.57, 6.30]
Task Value	6.01	1.06	[5.67, 6.34]	6.19	1.04	[5.78, 6.60]
Sense of Community	43.49	4.44	[40.46, 46.52]	30.58	14.62	[26.77, 34.38]

Note: CI = confidence interval.

The analysis suggests that students' self-efficacy and task value were comparable, regardless of classroom medium (traditional and online). A noticeable variation exists between the traditional and online sense of community. The traditional classroom students showed higher levels of community than those enrolled in the online class.

Students were asked how many online courses they had taken in their undergraduate coursework. The data shows a large percentage of students (38%) had enrolled in over 15 online

courses. The higher levels of enrollment in online coursework across both classroom mediums could have contributed to the comparable levels of self-efficacy and task value found between both the traditional and online students. Table 3 provides disaggregated number of online courses by frequency and percentage of enrolled students.

Table 3

Number of Online Courses Completed during Undergraduate Program (N = 67)

Number of Online Courses	Frequency	Percent
1-5	16	24
6-10	11	16
11-15	11	16
>15	25	38
None	4	6
Total	67	100

Univariate Normality. Preliminary assumption tests were generated to test for tenability of data. Histograms showed normality across the two groups on the dependent variables self-efficacy (Figure 4), task value (Figure 5), and sense of community (Figure 6).

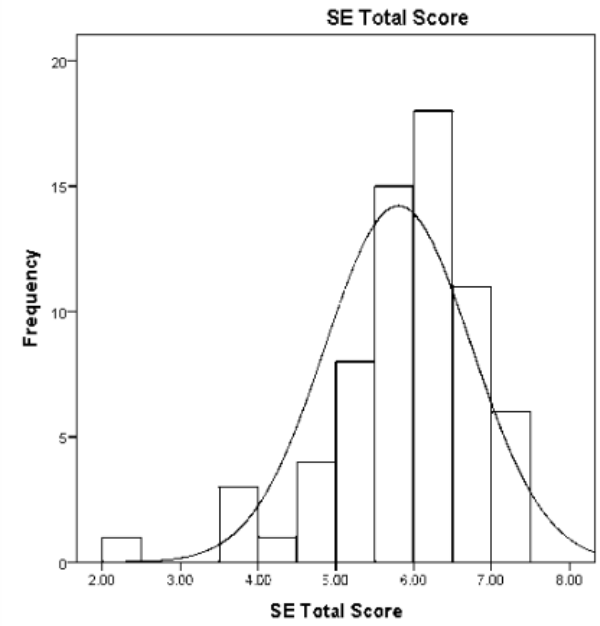

Figure 4. Self-efficacy Normality Histogram

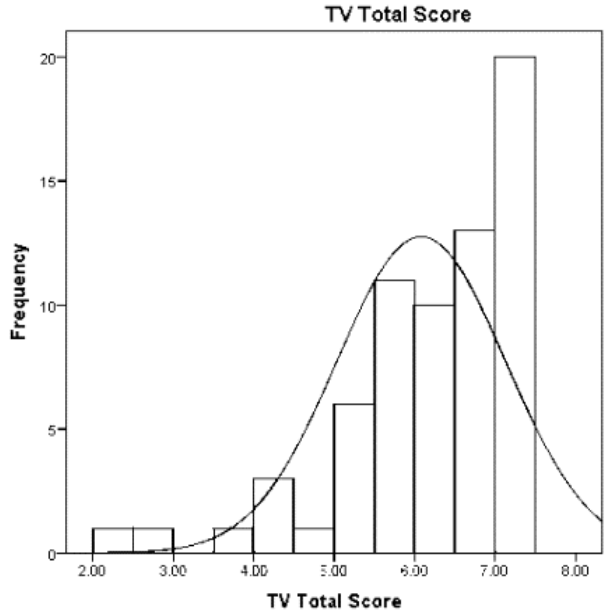

Figure 5. Task Value Normality Histogram

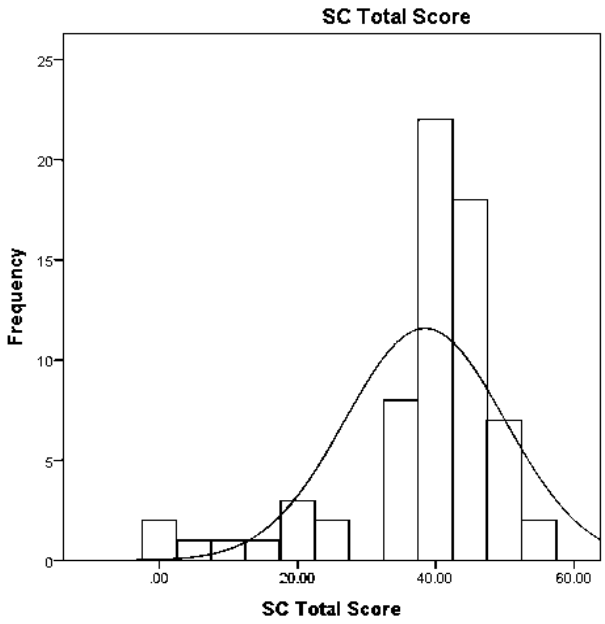

Figure 6. Sense of Community Normality Histogram

Outliers. To test for the assumption of extreme outliers, box plots were generated. The box plots yielded outliers in both self-efficacy and task value dependent variables. The outliers did not appear to significantly influence the data, therefore they remained as part of the data sets. As seen in Figure 10, there were no outliers in sense of community, and therefore is tenable.

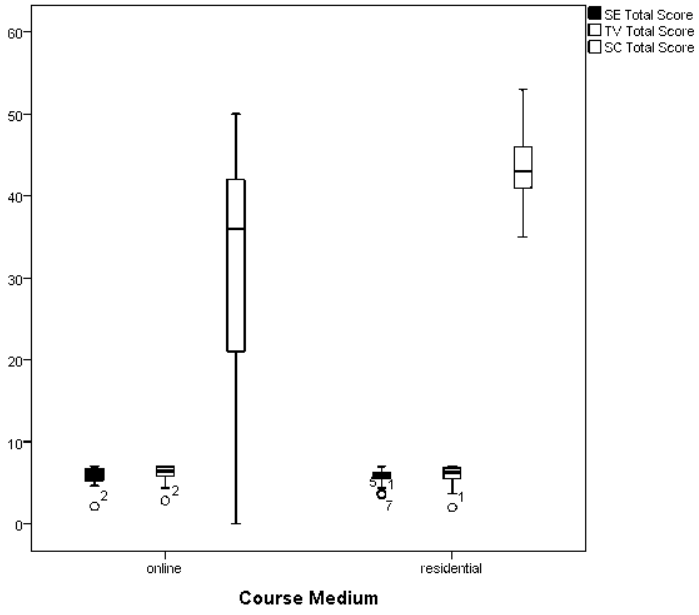

Figure 7. Box Plot: Traditional Classroom (n = 41) and Online Classroom (n = 26)

Multivariate Normality. There were no multivariate outliers in the data, as assessed by Mahalanobis distance ($p > .001$).

Multicollinearity. To test for multicollinearity between the dependent variables, self-efficacy, task value, and sense of community, Pearson's *r* correlation was generated. The results showed a very strong positive correlation for self-efficacy, $r = 1.00$. Task value resulted in a strong correlation, $r = .70$, $p = .001$. Sense of community demonstrated a very weak negative correlation, $r = -.13$, $p = .30$. There was a statistically significant difference between classroom medium (traditional and online) on the combined dependent variables, self-efficacy, task value, and sense of community, $F (3, 63) = 9.33$, $p < .0005$; Wilks' $\Lambda = .69$; partial $\eta 2 = .308$.

Homogeneity of Variance. Box's M test was used to analyze the assumption of the homogeneity of variance and found tenable with a score of 55.89 and $p = .000$. To test for the independence of observations, student survey scores on the dependent measures should not be influenced by or related to scores of other subjects. The scores of each survey instrument were independent of one another, therefore this assumption was not violated.

To analyze the data the researcher chose a multivariate analysis of variance (MANOVA) to compare the two groups (traditional classroom and online classroom) in terms of their means on a group of three dependent variables (self-efficacy, task value, and sense of community). A MANOVA test was chosen for the analysis due to its ability to measure multiple quantitative variables across two or more groups (Warner, 2008). Wilks' Lambda was analyzed. There was a statistically significant between the dependent variables and course type (traditional and online) and the intercept $F(3, 63) = 9.329$, $p < .001$, Wilks' $\Lambda = .692$; partial $\eta 2 = .308$. The results of the General Linear Model MANOVA are provided in Table 4.

Table 4

MANOVA Output Results for Course Type (Traditional and Online) (N = 67)

Effect	Test Statistic	Value	F	df	Sig.(*p*)	Partial η2
Intercept	Pillai's Trace	0.984	1330.307	3.0	0.000	0.984
	Wilks' Lambda	0.016	1330.307	3.0	0.000	0.984
	Hotelling's Trace.	63.348	1330.307	3.0	0.000	0.984
	Roy's Largest Root	63.348	1330.307	3.0	0.000	0.984
Course Type	Pillai's Trace	0.308	9.329	3.0	0.000	0.308
	Wilks' Lambda	0.692	9.329	3.0	0.000	0.308
	Hotelling's Trace.	0.444	9.329	3.0	0.000	0.308
	Roy's Largest Root	0.444	9.329	3.0	0.000	0.308

Null Hypothesis One

Null hypothesis one stated there is no statistically significant difference in self-efficacy for forensic science Criminal Investigation students based on the type of classroom modality (traditional and online) when measured by the *Motivated Strategies for Learning Self-Efficacy subscale.* An ANOVA was generated to determine if there was a statistically significant difference between course medium (traditional (M = 5.72, SD = .83, n = 41) and online (M = 5.93, SD = 1.10, n = 26)) and the dependent variable self-efficacy. The results indicated there is no statistically significant difference between course medium and self-efficacy, F (1,65) = .810, p = 0.37, ω^2 = -.003. The conclusion for self-efficacy in relation to course medium (traditional and online classroom) results in a failure to reject the null hypothesis.

Null Hypothesis Two

Null hypothesis two states there is no statistically significant difference in task value for forensic science Criminal Investigation students based on the type of classroom modality

(traditional and online) when measured by the *Motivated Strategies for Learning Questionnaire (MSLQ) Task Value subscale*. An ANOVA was generated to determine if there was a statistically significant difference between course medium (traditional (M = 6.01, *SD* = 1.06, *n* = 41) and online (*M* = 6.19, *SD* = 1.04, *n* = 26)) and the dependent variable task value. The results indicated there is no statistically significant relationship between course medium and task value, F (1, 65) = .421, p = 0.52, ω^2 = -.009. The conclusion for task value in relation to course medium (traditional and online classroom) results in a failure to reject the null hypothesis.

Null Hypothesis Three

Null hypothesis three states there is no statistically significant difference in sense of community for forensic science Criminal Investigation students based on the type of classroom modality (traditional and online) when measured by the *Classroom Community Scale (CCS).* An ANOVA was generated to determine if there was a statistically significant difference in sense of community scores between the traditional (*M* = 43.49, *SD* = 4.44, *n* = 41) and online (*M* = 30.58, *SD* = 14.62, *n* = 26) classrooms, F (1, 65) = 28.092, $p < .05$; partial $\eta 2$ = .302. The results of the Levene's test of equality of variances showed evidence that the dependent variable, sense of community was violated, $p < .0005$. A p value of less than .05 means that variance cannot be assumed (Szapkiw, 2013). Further analysis was conducted using the nonparametric Mann-Whitney u-test to confirm those results since nonparametric tests are less sensitive to homogeneity violations in data. Results for the Mann-Whitney U test were U = 219.50, z = -4.04, $p < .05$, ω^2 = .13. The results indicated a statically significant difference between sense of community and course medium (traditional and online classroom), thereby rejecting the null hypothesis.

The *Classroom Community Scale (CCS*) can be sub-divided into two subscales: connectedness and learning. An ANOVA was generated on these two subscales in relation to course medium (traditional and online). The connectedness subscale means and standard deviations by course medium are the traditional classroom ($M = 21.34$, $SD = 3.38$, $n = 41$) and the online classroom ($M = 16.85$, $SD = 7.68$, $n = 26$). The means and standard deviations for learning are the traditional classroom ($M = 22.05$, $SD = 2.61$, $n = 41$) and the online classroom ($M = 14.04$, $SD = 8.04$, $n = 26$). The results of the Levene's test of equality of variances showed evidence that the connectedness and learning subscales were violated, $F\ (1, 65) = 17.62$, $p < .05$; $F\ (1, 65) = 54.59$, $p < .0005$, respectively. Additional analysis was conducted using the nonparametric Mann-Whitney u-test to confirm those results since nonparametric tests are less sensitive to homogeneity violations in data. Results for the Mann-Whitney U test for connectedness were $U = 343.00$, $z = -2.45$, $p < .05$. The results for the learning subscale using the Mann-Whitney U test were $U = 181.00$, $z = -4.55$, $p <. 05$. The results indicated a statically significant difference between the connectedness and learning subscales when compared to course medium.

CHAPTER FIVE: CONCLUSIONS

Overview

The purpose of this quasi-experimental static group comparison design was used to examine if there was a statistically significant difference in self-efficacy, task value, and sense of community in undergraduate students enrolled in a criminal investigation course (CJUS 420) in both the traditional and online classrooms in a large, private university located in Lynchburg, Virginia. Both course mediums had comparable assignments and expectations. The traditional course took place during the spring 2018 semester. The online participants were enrolled in one of three 8-week semesters in the fall of 2017 or spring of 2018 (terms B and D). The students were evaluated on three levels: self-efficacy, task value, and sense of community. Self-efficacy and task value were measured using the *Motivated Strategies for Learning Questionnaire (MSLQ)*. Sense of community was measured using the *Classroom Community Scale (CCS).* The following chapter will begin with a discussion of the data analysis, followed by the conclusions, implications, and recommendations for future research.

Discussion

A MANOVA was used to determine if there was statistically significant difference between course medium (traditional and online) and the dependent variables (self-efficacy, task value, and sense of community). The test results resulted in no significant difference between self-efficacy and task value and course medium, demonstrating that students in both course mediums had comparable confidence levels in both self-efficacy and task value. These findings support other research where self-efficacy and task value are highly correlated due to expectancy of ability is related to learning (You, 2018). A significant difference ($p < .05$) was identified between sense of community and course medium (traditional and online). There was also a

significant difference ($p < .05$) identified in the *CCS* subscales of learning and connectedness. These results showed decreased levels of community existing in online students, versus higher feelings of connectedness in the traditional classroom students. These findings support research into classroom connectedness, where residential students experience higher levels of community, than those studying at a distance (Phirangee et al., 2016).

Null Hypothesis One

There were comparable results between self-efficacy levels in both traditional and online classrooms and is supported by the literature presented in this study. Students enrolled in both classroom modalities have the potential to exhibit high levels of confidence in both their personal capabilities to success, but also in their ability to meet course expectations. Additional research studies have found no significant difference in self-efficacy dependent upon classroom modality (Alt, 2015; Johnson, 2015; Mubeen & Reed, 2014; Taipjutorus et al., 2012). In contrast, Mgutshini, (2013) did find slightly higher levels of student perceived success in traditional students versus those in virtual classrooms, but these results were not conclusive in this study. The high self-efficacy levels could be attributed to the class rank of the students as juniors and seniors. Studies have shown that upperclassman often exhibit confidence in academic ability (Panadero, Jonsson, Botella, 2017). This current study also supports the trend toward expanding online educational degree programs, since students appear confident of their abilities in both mediums (Johnson, 2015). Additionally, this analysis provides support to traditional and online courses with comparable course syllabi. The traditional and online courses evaluated in this study had similar course objectives and outcomes, further providing support to the ability of universities to provide a comparable course experience in the virtual classroom (Frimming et al., 2013).

Null Hypothesis Two

Minimal research exists comparing task value levels in two separate classroom mediums (traditional and online). The similar results in task value scores, in both classroom modalities (traditional and online) support the limited literature references to the topic. Students in both classroom formats viewed their task value, or the practical application of material learned, as of value. The average median score of close to 6.0 (traditional classroom task value, $M = 6.01$, online classroom task value, $M = 6.19$) demonstrates the students perceived and enjoyed learning the content and that they would use the material again in their future coursework and/or or occupations. This research study will add to the literature regarding student perception of task value in both the traditional and online classrooms. The comparable results in both self-efficacy and task value have shown correlation in research, as confidence levels (self-efficacy) are often related to perception of applicability of course material (task value) (Johnson et al., 2014; You, 2018).

Null Hypothesis Three

Traditional students exhibited higher levels of connectedness to the classroom and peers than those enrolled in the online classroom. These results are largely supported by the literature in this research study. Phirangee et al. (2016) and Cho et al. (2014) found a statically significant difference in sense of community, rather decreased levels of community, between students enrolled in online coursework when compared to students in a comparable residential course. Research studies on increased student performance, satisfaction levels, and preference for instructor presence also contribute to students' connectedness preferring the residential classroom versus the online classroom (Buck et al., 2014; Frimming et al., 2013; Ross and Bell; 2007). Research conducted within the online classroom exclusively also provides insight into

the sense of disconnect online students feel from their course, peers, and the university in general (Ouzts, 2006).

Conclusions. Considering the results of this study, the large, private university where this study occurred, should be encouraged in regard to student confidence levels and value of learning within the forensic science classroom. With the demand for online educational degree programs steadily increasing (Forte et al., 2016), post-secondary institutions are endeavoring to provide similar course requirements and expectations in both traditional and online classrooms. Results of this study demonstrated that students perceive their level of confidence (self-efficacy) and applicability and value of the material learned (task value) are comparable within the criminal justice coursework, primarily this criminal investigation course (CJUS 420). Students enrolled in the undergraduate traditional and online criminal investigation courses had similar levels of self-efficacy and task value. Since self-efficacy is an important predictor of academic success, these results are relevant to educational administrators, who are continually evaluating the success of academic online programs (Mubeen & Reed, 2014; Panadero et al., 2017; Taipjutorus et al., 2012).

Additionally, one of the primary goals of online educators is to replicate the traditional classroom in the virtual environment (Artyushina & Sheypak, 2012; Jan, 2015). Since there was not a significant difference in the areas of self-efficacy and task value when compared to course medium, the university where this study occurred has been successful in developing a similar learning environment within their online academic programs, primarily in the areas of the forensic science criminal investigation coursework. Considering the online students do not receive the same level of hands-on application as those enrolled in the residential classroom, the perceived learning appears to be similar. This research is consistent with other studies conducted

between comparable traditional and online courses. Research conducted by Halupa and Caldwell (2015) found no significant difference between the traditional and online students in course effectiveness and performance. This was further supported by Lu and Lemonde (2012) where online delivery of coursework was found comparable to the traditional method. Additionally, these findings are supported by research which focused on student perceptions of experience in both a traditional and hybrid (combination of traditional and online) coursework where there was no statistical difference between the students from both groups (Frimming et al., 2013; Mgutshini, 2013).

Another factor of consideration which affects self-efficacy is a student's previous experience (or number of classes) in online education. Students who have completed a number of online courses exhibit greater levels of confidence in their current virtual courses (Cigdem & Yildirim, 2014; Jan, 2015). In 2017, over six million college students had completed in at least one online course (Online Learning Consortium, 2018). Of the online participants in this research study, 38% stated they had completed over fifteen online courses, while 93% of the sample size had enrolled at least one online course during their undergraduate program. This is a significant increase from other research studies where 30% of post-secondary students are enrolled in one online course (Frimming, et al., 2013). Due to the experience participating in online courses of this particular sample size, these results could help to explain the high levels of self-efficacy in the online students. Also, students who exhibit high levels of self-efficacy have been found to effectively regulate their course requirements (Alt, 2015). Therefore, it is acceptable to theorize these students are able to manage the online course expectations with success and are likely to finish their degree programs. Self-efficacy has been found to be correlated to a student's task value. The confidence to successfully complete course outcomes is

reflected in their motivation and association with the value of the content (Mubeen & Reed, 2014). This correlation between self-efficacy and task value was further supported by this research study, as similar findings occurred in both analyses.

When examining the sense of community in the traditional and online students participating in this study, there was a statistically significant difference in connectedness between the residential and online students. The traditional students exhibited higher levels of connectedness to both the course content, peers, and university. This is supported by previous research studies, where presence in the classroom creates feelings of community (Holmgreen, 2015; Lewis et al., 2015; Mason et al., 2010). A common response in the online students Likert Scale survey answers was a "1" rating, which corresponds to a "strongly agree" answer to questions like "I do not feel a spirit of community" and "I feel isolated in this course" (Rovai, 2002). Although this private university has endeavored to develop methods of increasing student connectedness at a distance, students enrolled in this particular online criminal investigation course expressed significant feelings of disconnect from their classroom.

Interestingly, the student participants of this research study were primarily classified as traditional college students, or those students under the age of 25. Within the sample size (N = 67), 64% of the students ranked themselves as under the age of 25. This finding is in contrast to research on online students, where the majority of students tend to be non-traditional and over the age of 25 (Johnson, 2015; Mgutshini, 2013; Tilley, 2014). These results did coincide with research conducted by Schroeder et al. (2016) who discovered that students between 21-25 years of age experienced less connectivity.

Implications

The goal of this research study was to add to the existing research encompassing forensic science coursework and classroom modality (traditional and online). After a careful review of research literature, it was clear that minimal studies have focused on student perception of confidence, task value, and sense of community when enrolled in the forensic science discipline, more specifically a criminal investigation course. Varying research studies have focused on self-efficacy and called for additional research. Taipjutorus et al. (2012) identified the need for research to examine confidence levels in the online learner and how to nurture this variable. Jan (2015) called for further research examining student satisfaction in online learning and how this relates to student performance. This study conclusively found that students perceive their confidence (self-efficacy) and task value to be equitable whether enrolled in the traditional or online classroom. These results indicate that Liberty University has been effective in recreating residential classroom content within the virtual classroom.

The analysis of connectedness in the online versus the traditional classroom further supports research trends that testify to feelings of disconnect for online students. Though universities continue to develop innovative techniques for scaffolding the environment in the traditional classroom online, students perpetually feel separated from professors, the classroom, and their peers. Interestingly, though the online students lack feelings of connectedness their perception of the value of what is learned and the application to their future careers remains elevated. Regardless, there is still an obvious demand for contemporary methods to develop feelings of connectedness for distance students.

One of the more surprising implications of this research was the ages of the participants and what this means for online student enrollment. Online students are often recognized over the age of 25 and considered a non-traditional student, but the participants in the research surveys

were primarily under the age of 25. This varied from existing research and would benefit from further analysis. These results may demonstrate a shift in online education, as younger undergraduate students are taking advantage of online coursework. An increase in traditional students' enrollment in online coursework would also support the steady, increasing online enrollment statistics. Though the traditional student preferred a residential classroom for its community and peer support, the convenience of online education may become a priority for these younger students.

Limitations

There are limitations to this study which may affect the interpretations of the data. The sample size was small which may provide challenges in generalizing the results to a larger student population. The sample was drawn from the students who self-registered for the specific course (CJUS 420) at one university. Though the data pool consisted of four separate terms within two semesters, the students attended the same university and participation was voluntary. This resulted in a smaller data pool from which to draw conclusions. It is also difficult to generalize results to outside populations of university students when this sample was inclusive to one educational institution within one specific course, therefore resulting in a lack of equivalence.

An additional limitation was voluntary participation. The survey was also optional and not a required component of the course requirements. The professors did encourage the students to complete the survey, but the survey remained voluntary and the students' grades were not affected if they elected to not participate. With the online coursework completed within a short eight-week period, students may have felt the pressure to meet course expectations rather than spending time completing a voluntary survey. This consideration may explain the higher levels

of participation in the traditional classroom students, where students enrolled in a fourteen-week course.

Another limitation to the study was the number of online student survey submissions. The online survey was available to students in three eight-week terms (fall of 2017, spring 2018). The average completion rate was eight submissions per semester and not a complete representation of the entire student sample which was in excess of 25 students per course. Generalization of the online participant data to a large population would be difficult with a sample size of $n = 26$.

Additionally, a self-report survey instrument was used to collect the data. Though both the *MSLQ* and *CCS* have been tested for validity in their results, the essence of a self-report requires students to reflect on their personal abilities. Anonymous, self-reporting on one's ability has the potential to be influenced by personal bias, exaggerated levels of accomplishment, and the inability to validate student results (Johnson et al., 2014; Kreuter, Presser, & Tourangeau, 2008). Another factor influencing online self-report surveys is frustration and disconnect from the physical presence of a classroom. It is difficult to remove student bias when using a survey instrument that requires self-reflection.

Recommendations for Future Research

Based on the results of this research study, there are recommendations for future research that would not only investigate the relationships existing between traditional and online students and their classrooms but provide college administrators insight into student perception of their coursework.

- Replicate the study with a larger sample size. Analysis from a larger sample size would allow for a generalization to student populations outside of this immediate criminal investigation classroom.
- Conducting the research study at more than one university would widen the student perceptions of their forensic science classrooms and allow researchers to develop a deeper understanding of traditional and online students sense of self-efficacy, task value, and sense of community.
- An additional construct to studying the perceived differences between traditional and online education is the instructor and their influence on the classroom environment. The presence of the instructor has the potential to statistically influence students' sense of connectedness to their classroom, even at a distance. Though research has been conducted on methods of increasing connectedness, such as videos, discussion boards, and instructor emails and phone calls, little research has focused on implementing these techniques within a forensic science classroom.
- Student levels of self-efficacy and task value have been found to be correlated to student performance (Taipjutorus et al., 2012). A supplemental study of this research would benefit from analyzing the *MSLQ* learning parameters in relation to overall student forensic science criminal investigation course grades.
- Research is also needed to evaluate the student fit for the online classroom versus attending a traditional classroom. Undergraduate students may not be equipped, prepared, or motivated to meet the expectations of an online student. Additionally, online classrooms require a level of independence and responsibility. Minimal research has analyzed student fit within the forensic science traditional and online classrooms.

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Appendix A

The Liberty University
Institutional Review Board
has approved this document
for use from 9/21/2017 to –
Protocol # 2993.092117

CONSENT FORM

Forensic Science Course Student Efficacy and sense of community: Comparing Traditional and Virtual Classroom Designs
Jennifer Lynn Hall-Rivera
Liberty University School of Education

You are invited to participate in an anonymous research study investigating student self-efficacy, task value, and sense of community within your classroom. You were selected as a possible participant because you are enrolled in CJUS 420 at Liberty University. Please read this form and ask any questions you may have before agreeing to be in the study.

Jennifer Hall-Rivera, a doctoral candidate in the School of Education at Liberty University, is conducting this study.

Background Information: The purpose of this anonymous study is to determine if there is a significant difference in student self-efficacy, task value, and sense of community dependent on the type of classroom in which you are enrolled, be it traditional or online.

Procedures: If you agree to be in this anonymous study, I would ask you to do the following things:

1. Access the survey link provided by your instructor. This will only take a few short minutes.
2. Complete the online survey, answering as honestly as possible. This will take approximately 15-20 minutes.
3. You will be asked to take the survey twice, once at the beginning of the course and once toward the end of the course.

Risks and Benefits of Participation: The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

Participants should not expect to receive a direct benefit from taking part in this study.

Compensation: Participants will not be compensated for participating in this study.

Confidentiality: The records of this study will be kept private. Research records will be stored securely, and only the researcher will have access to the records.

- The anonymous survey will be accessed by the participant. The researcher will not have access to the identity of the participant.
- Data will be stored on a password locked computer and may be used in future presentations. After three years, all electronic records will be deleted.

Voluntary Nature of the Study: Participation in this study is voluntary. Your course grades will not be affected by your decision to participate in this anonymous survey. Your decision whether or not to participate will not affect your current or future relations with Liberty University. If you The Liberty University Institutional Review Board has approved this document for use from 9/21/2017 to -- Protocol # 2993.092117 decide to participate, you are free to not answer any question or withdraw at any time prior to submitting the survey.

How to Withdraw from the Study: If you choose to withdraw from the study, please exit the survey and close your internet browser. Your responses will not be recorded or included in the study.

Contacts and Questions: The researcher conducting this study is Jennifer Hall-Rivera. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at jrivera55@liberty.edu. You may also contact the researcher's faculty advisor, Dr. Joanne Gilbreath, at jegilbreath@liberty.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 1887, Lynchburg, VA 24515 or email at irb@liberty.edu. *Please notify the researcher if you would like a copy of this information for your records.*

Statement of Consent: I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS IRB APPROVAL INFORMATION WITH CURRENT DATES HAS BEEN ADDED TO THIS DOCUMENT.)

Appendix B

September 21, 2017

Jennifer Hall Rivera

IRB Exemption 2993.092117: Forensic Science Course Self-Efficacy, Task Value, and Sense of Community: Comparing Traditional and Online Classroom Designs

Dear Jennifer Hall Rivera,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under exemption category 46.101(b)(2), which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:101(b):

> (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:
> (i) information obtained is recorded in such a manner that human subjects can be identified,
>
> LIBERTY UNIVERSITY.
> INSTITUTIONAL REVIEW BOARD
>
> directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Please note that this exemption only applies to your current research application, and any changes to your protocol must be reported to the Liberty IRB for verification of continued exemption status. You may report these changes by submitting a change in protocol form or a new application to the IRB and referencing the above IRB Exemption number.

If you have any questions about this exemption or need assistance in determining whether possible changes to your protocol would change your exemption status, please email us at irb@liberty.edu.

Sincerely,

G. Michele Baker, MA, CIP

Administrative Chair of Institutional Research

The Graduate School

LIBERTY UNIVERSITY.

Liberty University | Training Champions for Christ since 1971

Appendix C

Alfred Rovai <alfrrov@regent.edu>

Thu 6/23/2016, 8:44 PM

Good evening,

Yes, you may reproduce and use the Classroom Community Scale for your dissertation research. Make sure to reference the source Internet & Higher Education journal article in any report you write.

Best wishes,

Fred Rovai

Sent from my iPhone

Appendix D

Katie Schmitt <katielsc@umich.edu>

Fri 6/24/2016, 12:00 PM

2013MSLQManual.pdf

Hi Jennifer,

Thank you for your inquiry. You have permission to use the MSLQ, please just cite it appropriately. You do not need to purchase the right to use this. I've attached a pdf copy of the mslq and relevant documentation.

Best,

Katie

Katie Schmitt

Program Coordinator

Combined Program in Education and Psychology

University of Michigan

(734) 763-0680

Appendix E

Dear CJUS 420 Online Professor,

In an effort to learn more about how undergraduate criminal investigation students perceive the effectiveness of their course regarding self-efficacy, task value, and sense of community at the end of a criminal investigation course, I am conducting a quantitative study entitled " Forensic Science Course Self-efficacy, Task Value, and Sense of Community: Comparing Traditional and Online Classroom Designs" as part of the requirements for my doctoral dissertation through Liberty University. As the instructor of CJUS 420 online, in one of the following semesters (fall 2017 D sub-term, spring 2018 B and D sub-terms), I thank you in advance for your willingness to aid in my research. This research study has been approved by Dean Miller of the Helms School of Government, Liberty University. Your responsibilities are minimal, as I will only need you to email the anonymous student surveys per the schedule below:

Fall 2017: Pre-survey: The following is a summary of the pre-survey schedule which will be made available to the online students, via email weblink, for one week. *Professors of this course are asked to email the survey information to students the first (October 30, 2017) and fourth day (November 2, 2017) of class.*

- Fall 2017 D sub-term: October 30, with an access deadline of November 6, 2017

Fall 2017: Post Survey: The following is a summary of the post-survey schedule which will be made available to the online students, via email weblink, for one week. *Professors are asked to email the survey information to the students on December 15, 2017 and December 19, 2017.*

- Fall 2017 D sub-term: December 15, with an access deadline of December 22, 2017

Spring 2018: Pre-survey: The following is a summary of the pre-survey schedule which will be made available to the online students for one week. *Professors of this course are asked to email the survey information to students the first and fourth day of class*.

- Spring 2018 B sub-term: First email: January 22, 2108, Follow-up email: January 25, 2018, with an access deadline of January 29, 2018
- Spring 2018 D sub-term: First email: March 26, 2018, Follow-up email: March 29, 2018, with an access deadline of April 2, 2018

Spring 2018: Post-survey: The following is a summary of the post-survey schedule which will be made available to the online students, via email weblink, for one week. *Professors are asked to email the survey information to the students on the assigned days below*.

- Spring 2018 B sub-term: First email: March 9, 2018, Follow-up email: March 13, 2018, with an access deadline of March 16, 2018
- Spring 2018 D sub-term: First email: May 11, 2018, Follow-up email: May 15, 2018, with an access deadline of May 18, 2018

Thank you again for your time and assistance with my dissertation research. Your student's input will not only provide valuable information to my research but will add to the body of knowledge in the educational community regarding the criminal investigation classroom.

Sincerely,

Jennifer Hall Rivera Doctoral Candidate Liberty University

Appendix F

Call for Participants: Pre-Course Survey

Dear CJUS 420 Online Student:

In an effort to learn more about how undergraduate criminal investigation students perceive the effectiveness of their course regarding self-efficacy, task value, and sense of community, I am conducting a quantitative study entitled " Forensic Science Course Self-efficacy, Task Value, and Sense of Community: Comparing Traditional and Online Classroom Designs" as part of the requirements for my doctoral dissertation through Liberty University. You have been selected for this anonymous survey due to your enrollment in CJUS 420 D subterm for the fall 2017 semester. Completing the online survey does not require any personal information and only requires a few minutes of your time. The consent to participate is available on the first page of the online survey. This pre-course survey can be accessed at the following link http://survey.sogosurvey.com/r/k4osBk

Access to this online survey will only be available for one week, with a deadline of November 6, 2017.

Thank you for your time and consideration. Your input will not only provide valuable information to my research, but will add to the body of knowledge in the educational community regarding the criminal investigation classroom.

Sincerely,

Jennifer Hall Rivera

Doctoral Candidate

Liberty University

Appendix G

Call for Participants: Post-Course Survey

Dear CJUS 420 Online Student:

In an effort to learn more about how undergraduate criminal investigation students perceive the effectiveness of their course regarding self-efficacy, task value, and sense of community at the end of a criminal investigation course, I am conducting a quantitative study entitled " Forensic Science Course Self-efficacy, Task Value, and Sense of Community: Comparing Traditional and Online Classroom Designs" as part of the requirements for my doctoral dissertation through Liberty University. You have been selected for this anonymous survey due to your enrollment in CJUS 420 D subterm for the fall 2017 semester. Completing the online survey does not require any personal information and only requires a few minutes of your time. The consent to participate disclosure is available on the first page of the online survey. This post-course survey can be accessed at the following link: http://survey.sogosurvey.com/r/k4osBk

Access to this online survey will only be available through December 22, 2017. Even if you did not participate in the pre-course survey, you are welcome to participate in the end-of-course survey.

Thank you for your time and consideration. Your input will not only provide valuable information to my research, but will add to the body of knowledge in the educational community regarding the criminal investigation classroom.

Sincerely,

Jennifer Hall Rivera

Doctoral Candidate

Liberty University

Appendix H

Call for Participants: Pre-Course Survey

Dear CJUS 420 Online Student:

In an effort to learn more about how undergraduate criminal investigation students perceive the effectiveness of their course regarding self-efficacy, task value, and sense of community, I am conducting a quantitative study entitled " Forensic Science Course Self-efficacy, Task Value, and Sense of Community: Comparing Traditional and Online Classroom Designs" as part of the requirements for my doctoral dissertation through Liberty University. You have been selected for this anonymous survey due to your enrollment in CJUS 420 B subterm for the spring 2018 semester.

If you choose to participate, you will be asked to take a survey. Completing the online survey does not require any personal information and only requires a few minutes of your time. The consent to participate information is available for you on page one of the online survey. This pre course survey can be accessed at the following link: http://survey.sogosurvey.com/r/xt6fLa

Access to this online survey will only be available for one week, with a deadline of January 29, 2018.

Thank you for your time and consideration. Your input will not only provide valuable information to my research but will add to the body of knowledge in the educational community regarding the criminal investigation classroom.

Sincerely,

Jennifer Hall Rivera

Doctoral Candidate

Liberty University

Appendix I

Call for Participants: Post-Course Survey

Dear CJUS 420 Online Student:

In an effort to learn more about how undergraduate criminal investigation students perceive the effectiveness of their course regarding self-efficacy, task value, and sense of community at the end of a criminal investigation course, I am conducting a quantitative study entitled " Forensic Science Course Self-efficacy, Task Value, and Sense of Community: Comparing Traditional and Online Classroom Designs" as part of the requirements for my doctoral dissertation through Liberty University. You have been selected for this anonymous survey due to your enrollment in CJUS 420 B subterm for the spring 2018 semester.

If you choose to participate, you will be asked to take a survey. Completing the online survey does not require any personal information and only requires a few minutes of your time. The consent to participate information is provided for you on the first page of the online survey. This post-course survey can be accessed at the following link: http://survey.sogosurvey.com/r/xt6fLa Access to this online survey will only be available through March 16, 2018. Even if you did not participate in the pre-course survey, you are welcome to participate in the end-of-course survey. Thank you for your time and consideration. Your input will not only provide valuable information to my research but will add to the body of knowledge in the educational community regarding the criminal investigation classroom.

Sincerely,

Jennifer Hall Rivera

Doctoral Candidate

Liberty University

Appendix J

Call for Participants: Pre-Course Survey

Dear CJUS 420 Online Student:

In an effort to learn more about how undergraduate criminal investigation students perceive the effectiveness of their course regarding self-efficacy, task value, and sense of community, I am conducting a quantitative study entitled " Forensic Science Course Self-efficacy, Task Value, and

Sense of Community: Comparing Traditional and Online Classroom Designs" as part of the requirements for my doctoral dissertation through Liberty University. You have been selected for this anonymous survey due to your enrollment in CJUS 420 D subterm for the spring 2018 semester. Completing the online survey does not require any personal information and only requires a few minutes of your time. The consent to participate information will be available for you on the first page of the online survey. This pre-course survey can be accessed at the following link: http://survey.sogosurvey.com/r/zyO5dK

Access to this online survey will only be available for one week, with a deadline of through April 2, 2018.

Thank you for your time and consideration. Your input will not only provide valuable information to my research, but will add to the body of knowledge in the educational community regarding the criminal investigation classroom.

Sincerely,

Jennifer Hall Rivera

Doctoral Candidate

Liberty University

Appendix K

Call for Participants: Post-Course Survey

Dear CJUS 420 Online Student:

In an effort to learn more about how undergraduate criminal investigation students perceive the effectiveness of their course regarding self-efficacy, task value, and sense of community at the end of a criminal investigation course, I am conducting a quantitative study entitled " Forensic Science Course Self-efficacy, Task Value, and Sense of Community: Comparing Traditional and Online Classroom Designs" as part of the requirements for my doctoral dissertation through Liberty University. You have been selected for this anonymous survey due to your enrollment in CJUS 420 D subterm for the spring 2018 semester. Completing the online survey does not require any personal information and only requires a few minutes of your time. The consent to participate information is provided for you on the first page of the online survey. This post course survey can be accessed at the following link: http://survey.sogosurvey.com/r/gubfsi Access to this online survey will only be available through May 18, 2018. Even if you did not participate in the pre-course survey, you are welcome to participate in the end-of-course survey. Thank you for your time and consideration. Your input will not only provide valuable information to my research, but will add to the body of knowledge in the educational community regarding the criminal investigation classroom.

Sincerely,

Jennifer Hall Rivera

Doctoral Candidate

Liberty University

Appendix L

Dear CJUS 420 Residential Professor,

In an effort to learn more about how undergraduate criminal investigation students perceive the effectiveness of their course regarding self-efficacy, task value, and sense of community at the end of a criminal investigation course, I am conducting a quantitative study entitled " Forensic Science Course Self-efficacy, Task Value, and Sense of Community: Comparing Traditional and Online Classroom Designs" as part of the requirements for my doctoral dissertation through Liberty University. As the instructor of CJUS 420 spring 2018 semester, I thank you in advance for your willingness to aid in my research. Your responsibilities are minimal, as I will only need you to distribute the Call to Participate student hand-out, in addition to email the handout to students. This research study has been approved by Dean Miller of the Helms School of Government, Liberty University.

Pre-course survey: The following is a summary of the pre-survey schedule which will be made available to the traditional students, via an active link for two weeks. Professors of this course are asked to distribute a Call to Participate handout to students on the first day of class (January 22, 2018), in addition to emailing the students a reminder on the fourth day of class (January 25, 2018) with the Call to Participate handout attached. • Spring 2018 14-week residential term: January 22, 2018, with an access deadline of February 2, 2018

Post-course survey: The following is a summary of the post-survey schedule which will be made available to the traditional students, via an active link for two weeks. Professors of this course are asked to distribute a Call to Participate handout to students on May 1st, 2018, in addition to emailing the students a reminder on May 4, 2018 with the Call to Participate handout attached. • Spring 2018 14-week residential term: May 1, 2018, with an access deadline of May 15, 2018

Thank you again for your time and assistance with my dissertation research. Your student's input will not only provide valuable information to my research but will add to the body of knowledge in the educational community regarding the criminal investigation classroom.

Sincerely,

Jennifer Hall Rivera Doctoral Candidate Liberty University

Appendix M

Call for Participants: Pre-Course Survey

Dear CJUS 420 Residential Student:

In an effort to learn more about how undergraduate criminal investigation students perceive the effectiveness of their course regarding self-efficacy, task value, and sense of community, I am conducting a quantitative study entitled " Forensic Science Course Self efficacy, Task Value, and Sense of Community: Comparing Traditional and Online Classroom Designs" as part of the requirements for my doctoral dissertation through Liberty University.

You have been selected for this anonymous survey due to your enrollment in CJUS 420 for the spring 2018 semester.

If you choose to participate, you will be asked to take a survey. Completing the online survey does not require any personal information and only requires a few minutes of your time. The consent to participate information will be available for you on the first page of the online survey. This pre-course survey can be accessed at the following link:http://survey.sogosurvey.com/r/wCridp

Access to this online survey will only be available through February 2, 2018.

Thank you for your time and consideration. Your input will not only provide valuable information to my research but will add to the body of knowledge in the educational community regarding the criminal investigation classroom.

Sincerely,

Jennifer Hall Rivera

Doctoral Candidate

Liberty University

Appendix N

Call for Participants: Post-Course Survey

Dear CJUS 420 Residential Student:

In an effort to learn more about how undergraduate criminal investigation students perceive the effectiveness of their course regarding self-efficacy, task value, and sense of community at the end of a criminal investigation course, I am conducting a quantitative study entitled " Forensic Science Course Self-efficacy, Task Value, and Sense of Community: Comparing Traditional and Online Classroom Designs" as part of the requirements for my doctoral dissertation through Liberty University. You have been selected for this anonymous survey due to your enrollment in CJUS 420 for the spring 2018 semester. Completing the online survey does not require any personal information and only requires a few minutes of your time. The consent to participate information will be available for you on the first page of the online survey. This post-course survey can be accessed at the following link:

http://survey.sogosurvey.com/r/neI9do

Access to this online survey will only be available through May 15, 2018. Even if you did not participate in the pre-course survey, you are welcome to participate in the end-of-course survey. Thank you for your time and consideration. Your input will not only provide valuable information to my research, but will add to the body of knowledge in the educational community regarding the criminal investigation classroom.

Sincerely,

Jennifer Hall Rivera

Doctoral Candidate

Liberty University

Appendix O

Research Survey Instrument

What is your gender? (Select one option)

- ◯ Male
- ◯ Female

What is your ethnicity? (Select one option)

- ◯ American Indian or Alaska Native
- ◯ Asian
- ◯ Black or African American
- ◯ Hispanic or Latino
- ◯ Multiracial
- ◯ Native Hawaiian and Other Pacific Islander
- ◯ White
- ◯ Prefer not to answer

What is your age range? (Select one option)

- ◯ 18- 25 years
- ◯ Over the age of 25 years

What is your classification? (Select one option)

- ◯ Freshman
- ◯ Sophomore
- ◯ Junior
- ◯ Senior

How many online classes have you completed? (Select one option)

- ◯ None
- ◯ 1-5
- ◯ 6-10
- ◯ 11-15
- ◯ Over 15

I am enrolled in: (Select one option)

- ◯ CJUS 420 Traditional classroom
- ◯ CJUS 420 Online
- ◯ Other

I believe I will receive an excellent grade in this class. (Select one option)

Not at all true of me. 1	2	3	Somewhat true of me. 4	5	6	Very true of me. 7

I'm certain I can understand the most difficult material presented in the readings for this course. (Select one option)

Not at all true of me 1	2	3	Somewhat true of me 4	5	6	Very true of me 7

I'm confident I can learn the basic concepts taught in this course. (Select one option)

Not at all true of me 1	2	3	Somewhat true of me 4	5	6	Very true of me 7

I'm confident I can understand the most complex material presented by the instructor in this course. (Select one option)

Not at all true of me 1	2	3	Somewhat true of me 4	5	6	Very true of me 7

I'm confident I can do an excellent job on the assignments and tests in this course. (Select one option)

Not at all true of me 1	2	3	Somewhat true of me 4	5	6	Very true of me 7

I expect to do well in this class. (Select one option)

Not at all true of me 1	2	3	Somewhat true of me 4	5	6	Very true of me 7

I'm certain I can master the skills being taught in this class. (Select one option)

Not at all true of me 1	2	3	Somewhat true of me 4	5	6	Very true of me 7

Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class. (Select one option)

Not at all true of me 1	2	3	Somewhat true of me 4	5	6	Very true of me 7

I think I will be able to use what I learn in this course in other courses. (Select one option)

1	2	3	4	5	6	7

It is important for me to learn the course material in this class. (Select one option)

1	2	3	4	5	6	7

I am very interested in the content area of this course. (Select one option)

1	2	3	4	5	6	7

I think the course material in this class is useful for me to learn. (Select one option)

1	2	3	4	5	6	7

I like the subject matter of this course. (Select one option)

1	2	3	4	5	6	7

Understanding the subject matter of this course is very important to me.

(Select one option)

1	2	3	4	5	6	7

I feel that students in this course care about each other. (Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

I feel that I am encouraged to ask questions.

(Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

I feel connected to others in this course. (Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

I feel that it is hard to get help when I have a question. (Select one option)

	Agree	Neutral	Disagree	

Strongly agree 1	2	3	4	Strongly disagree 5

I do not feel a spirit of community.

(Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

I feel that I receive timely feedback.

(Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

I feel that this course is like a family. (Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

I feel uneasy exposing gaps in my understanding. (Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

I feel isolated in this course. (Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

I feel reluctant to speak openly. (Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

*** 32. I trust others in this course.** (Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

I feel that this course results in only modest learning.

(Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

I feel that I can rely on others in this course. (Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

I feel that other students do not help me learn. (Select one option)

Strongly agree	Agree 2	Neutral 3	Disagree 4	Strongly disagree

1				5

I feel that members of this course depend on me. (Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

I feel that I am given ample opportunities to learn. (Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5

I feel uncertain about others in this course.

(Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

I feel that my educational needs are not being met.

(Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

I feel confident that others will support me. (Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

I feel that this course does not promote a desire to learn.

(Select one option)

Strongly agree 1	Agree 2	Neutral 3	Disagree 4	Strongly disagree 5

Appendix P

LIBERTY UNIVERSITY
CJUS 420 CRIMINAL INVESTIGATIONS I

I. Course Description:

This course is designed to present the fundamentals of modern criminal investigation, commencing with crime scene investigations and concluding with interview/ interrogation techniques. The student will study the principles of criminal investigation conducted within the framework of the U. S. Constitution. The student will learn how these principles are applied to the investigation of various major felonies.

II. Rationale:

The purpose of this course is to provide an overview of principles of criminal investigation in the United States.

III. Prerequisites:

All prerequisites for this course, as defined by the Helms School of Government, Criminal Justice Degree major in the University Undergraduate Catalog, are required. In addition, it is expected that the student will be able to master the reading requirements, be able to define specific legal terminology used in U. S. court systems, be able to define specific medical/scientific terminology used in criminal investigations and be able to develop this knowledge outside the classroom.

IV. Materials List:

Required text:

Laskey, J., Guskos, N., and Seymour, R.A.(2014). *Criminal Investigation: An Illustrated Case Study Approach* Upper Saddle River, NJ: Pearson Education, Inc.

A Bible

V. Learning Outcomes:

The student will be able to:

1. To learn logical methods of conducting criminal investigations of specific crimes, through the use of modern techniques from the fields of medicine, forensic science, and psychology.
2. To learn how successful criminal investigations are conducted in the U.S. within the confines of the Constitution.

3. Identify key terms when conducting criminal investigations to include but not limited to:
   - Jurisdiction;
   - Recognizing and identifying physical evidence-taking physical evidence and acquiring appropriate exemplars, striations and altering contrast;
   - Recognizing how guilt is determined in each crime;
   - Know the 4 objectives to an interrogation;
   - Know the elements that trigger the administration of one's Miranda Warnings and
   - Distinguish how an offender's Modus Operandi effects an investigation

VI. Assignments:

1. Exams and Quizzes:

i. There will be four exams, which will consist of multiple choice and true/false type questions. These questions will be taken from the course text mostly and class instruction.
ii. There will be 20 quizzes, which will consist of multiple choice and true/false type questions. These questions will be taken from the course text.

Assignment	Points
EXAM 1 (Chapters 1-5)	100
EXAM 2 (Chapters 6-10)	100
EXAM 3 (Chapters 11-15)	100
EXAM 4 (Chapters 16-20)	100
20 Quizzes-each worth 10 points each	200
Review Questions (5 questions from each chapter, each worth 1 point)	100
Research Project/Paper (5-7 page 3-minimum per person/5 separate references) [100 Point Paper (20 points outline/80 points paper) and 1 [50] point Critical Evaluation Review]	150
Class exercises (5 at 20 points each)	100
Power Point Presentation and Information Participation, Integration of topic, Demeanor (Presentation rubric will be provided)	50
Total	1,000

2. Research Paper and Presentation:

The research paper will be an individual assignment. There are point deductions are 10%/day for work turned in late.

Elements:

The research paper will be turned in via Safe Assign by 11:59 pm November 27, 2017. The critical reading will also be on November 27, 2017. The following are the criteria for the paper:

a. Paper OUTLINE due 11/10/17. Must include at least five (5) peer-reviewed articles.
b. The paper will be 5-7 pages, not including title page, abstract, table of contents (if included), and reference section
c. The paper will comply with APA 6th Edition standards.
d. The paper will be an individual effort.
e. The paper will be based on the topic selected from course topics
f. The paper will have a section reflecting a Christian Worldview and the application to the subject that was chosen.
g. There will be a minimum of 5 different/distinct references – no wiki, no paper services, no "general" sources. Must use peer-reviewed journals only.

Evaluation Review: One source paper must be evaluated through a critical evaluation process. This MUST be a peer-reviewed paper.

Grading

Rubrics for the research paper and presentation will be provided.

Presentation:

Each person will have 5-10 minutes (10 minutes maximum) in class to present their paper. The presentation should include: **Title**, **Abstract (summary)**, **Introduction**-the topic/research thesis/question, **Content**-overview and analysis of the research, **Conclusion**, and **References**.

3. Review Questions

Each book chapter (20 Chapters) has review questions. You will select 5 questions from each chapter and answer them. A template will be provided, and you will submit your questions and answers via Safe Assign.

4. Class Exercises

You will have 5 class exercises each worth 20 points. A template and example will be provided for the submission of your exercise material to Safe Assign. The five exercises include:

1. Crime scene processing
2. Investigative lead development
3. Interviewing strategy
4. Report writing
5. Testimony

VII. **Grading Policy**: I do not adjust your final score-for example, a 799 score will not be adjusted up to a B-it is a C.

A = 900–1000 B = 800–899 C = 700–799 D = 600–699 F = 0–599
FN = Automatic failure and withdrawal for non-attendance

VIII. Other Policies

CJUS Policy:

The nature of the criminal justice community demands that persons involved be of a high level of integrity and education is not merely academic in nature, but is holistic. Students enrolled in CJUS courses will be held to a high standard. Self-control is imperative for CJUS practitioners. If not "merely" to honor Christ, your family, and this academic institution, on a purely pragmatic level, in anticipation of future employability in the career field of your choice, conduct yourselves so as not to place yourselves in difficult and embarrassing situations.

Appendix Q

LIBERTY UNIVERSITY

COURSE SYLLABUS

CJUS420
CRIMINAL INVESTIGATIONS I

COURSE DESCRIPTION

This course will address the constitutional requirements for conducting criminal investigations, essential techniques for processing a crime scene, and methodology for collecting evidence via subpoenas and interviews.

RATIONALE

The purpose of this course is to provide an overview of principles of criminal investigation in the United States.

I. PREREQUISITE

For information regarding prerequisites for this course, please refer to the Academic Course Catalog.

II. REQUIRED RESOURCE PURCHASE

Click on the following link to view the required resource(s) for the term in which you are registered: http://bookstore.mbsdirect.net/liberty.htm

III. ADDITIONAL MATERIALS FOR LEARNING

A. Computer

B. Internet access (broadband recommended)

C. Microsoft Word
(Microsoft Office is available at a special discount to Liberty University students.)

IV. MEASURABLE LEARNING OUTCOMES

Upon successful completion of this course, the student will be able to:

A. Describe specific legal concepts in relation to criminal investigations.

B. Identify the proper steps of crime scene processing.

C. Evaluate the methods of appropriate evidence preservation for specific forensic analysis.

D. Summarize methods of obtaining information from witnesses and databases.

E. Explain the appropriate utilization of confidential informants during a criminal investigation.

F. Explain specific physical and electronic surveillance techniques.

G. Understand the logical steps utilized to obtain a confession during an interrogation.

H. Explain the logical process of conducting a criminal investigation within the confines of the U.S. Constitution.

I. Integrate biblical principles into the ethical decision making process.

V. COURSE REQUIREMENTS AND ASSIGNMENTS

A. Textbook readings and lecture presentations/notes

B. Course Requirements Checklist
After reading the Syllabus and Student Expectations, the student will complete the related checklist found in Module/Week 1.

C. Discussion Board Forums (7)

There will be 7 Discussion Board Forums throughout this course. The student is required to provide a thread in response to the provided topic for each forum. Each thread is to be 150–200 words and demonstrate course-related knowledge. In addition to the thread, the student is required to reply to 2 other classmates' threads. Each reply must be 125–150 words.

D. Research Paper Topic

The student will choose a topic for the Research Paper related to criminal investigation and submit it along with at least 2 references.

E. Research Paper

The student will write a 5-page research-oriented paper in current APA format that focuses on criminal investigation. The paper must include at least 5 sources (not including the class textbook and the Bible). The paper will be submitted through SafeAssign.

F. Exams (2)

There will be a Midterm and a Final Exam in this course. Each exam will cover the textbook readings and will be open-book/open-notes, contain 50 true/false and multiplechoice questions as well as 1 essay question, and have a time limit of 2 hours and 30 minutes.

VI. COURSE GRADING AND POLICIES

A. Points

Course Requirements Checklist	10
Discussion Board Forums (7 at 50 pts ea)	350

Research Paper Topic		25
Research Paper		225
Midterm Exam	(Modules 1–4)	200
Final Exam	(Modules 5–8)	200
	Total	1010

B. Scale

A = 900–1010 B = 800–899 C = 700–799 D = 600–699 F = 0–599

CJUS 420 Course Syllabus

C. Disability Assistance Students with a documented disability may contact Liberty University Online's Office of Disability Academic Support (ODAS) at LUOODAS@liberty.edu to make arrangements for academic accommodations. Further information can be found at www.liberty.edu/disabilitysupport.