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The Effect of Collaboration on Online Student Motivation in a College Biology Course

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THE EFFECT OF COLLABORATION ON ONLINE STUDENT MOTIVATION IN A COLLEGE BIOLOGY COURSE

by

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DEDICATION

I dedicate this dissertation to my family.

To my best friend and husband Jason, you have encouraged and supported me through this journey and all others. I am forever grateful.

To our children Max, Elias, and Finleigh, I hope watching your mom work so hard to achieve this dream has shown you that anything is possible.

To my parents, you have nurtured and guided me since day one, thank you.

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ABSTRACT

Online coursework in higher education is an accessible, cost-effective alternative for students and institutions. As demand for online courses grows, the need to address discrepancies in online student success and elevated attrition rates is a pressing issue in higher education. Instructional methods in online classrooms are a potential lever for minimizing these gaps. Research indicates motivation is a key indicator of student success and can have a positive impact on student achievement and persistence, whether online or in a traditional classroom setting. Collaboration, including social interaction, has also been shown to have a positive impact on student outcomes, and can potentially lessen the isolation online learners report feeling. Using a college online biology class, this action research study employed quantitative methods to examine the effect of collaborative activities on student motivation through the administration of the Motivated Strategies for Learning Questionnaire (MSLQ). Additionally, student achievement was compared on independent discussion posts and on collaboratively constructed posts, and student perceptions of collaboration were evaluated through administration of a questionnaire at the conclusion of the study. No significant change was seen in student motivation levels after the introduction of collaboration; yet, the students recognized the advantage of the introduction of collaboration as the exposure to new perspectives and social connection. The significance of this study is the examination of an instructional technique's effect on motivation of students in an online biological sciences course taught at a technical college, in an effort to increase student success and limit attrition.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

List of Abbreviations

BIO 101 ..... Biological Sciences

BTC ..... Beachside Technical College

CL ..... Collaborative Learning

D2L ..... Desire 2 Learn

DE ..... Distance Education

DiP ..... Dissertation in Practice

DL ..... Distance learning

DLi ..... Distance Learning Institute

GPA ..... Grade Point Average

LMS ..... Learning Management System

MSLQ ..... Motivated Strategies for Learning Questionnaire

PoP ..... Problem of Practice

STEM ..... Science Technology Engineering and Mathematics

ZPD ..... Zone of Proximal Development

CHAPTER ONE

INTRODUCTION

Research, a systematic process of inquiry to determine answers to posed questions, can be traditional in nature or active. Mertler (2014) points out traditional research uses objective methods with the goal of understanding an educational issue or process. Typically, investigators removed from the environment of the study conduct traditional research. For this reason, educational practitioners, including myself, often find traditional research foreign to their own classroom and struggle to apply these research findings to their classrooms or students. Dissatisfaction with research findings is "largely due to the fact that traditional educational researchers have a tendency to impose abstract research findings on schools and teachers with little to no attention paid to local variation and required adaptations" (Mertler, 2014, p. 13). It is difficult to find significance or potential application in traditional research findings if a researcher is removed from the research site, and therefore does not understand the intricacies and uniqueness of the students or school.

Action research however, takes place in the trenches, on-site of where the research question originated, and is conducted by the practitioner asking the question. This type of research enables direct application of conclusions to the target population, the practitioner's students in their classroom. Choi (2011) asserts, "Given the underlying assumption action research in teacher education programs is not intended to transform

teachers into academic researchers, but rather to foster reflective teaching, most teacher education programs have actively moved away from the traditional academic research Framework" (p. 36). Action research provides methods for educators to conduct relevant research within the environment where the findings directly apply, making the findings significant, and aiding educators in improving their practice. As an educator, I find action research to be the most applicable research method for me because it is conducted at my institution, with students I teach. This type of research produces data I can employ to improve my practice and the success of my students without the translation necessary in offsite traditional research.

Research Focus

This research study employed action research methods to investigate an identified problem of practice, higher withdrawal rates and lowered success rates in online and hybrid introductory level biology courses in comparison to their traditional counterparts. In higher education, the advantages of offering online courses are plentiful: meeting increased student demand, financial gain, convenience of scheduling, and the absence of a needed classroom site. This has propelled colleges and universities to increase online course offerings; rates of students completing online coursework in higher education have tripled in the last decade (Allen & Seaman, 2013). Community and technical colleges saw an initial spike and now a downturn in enrollment in the last two decades, because of the country's economic crisis and recovery. "Employment and unemployment rates, much more than the number of high school graduates or other population trends -- which are important over time but very slow moving -- are the biggest factors driving enrollment for community colleges" (Johnson, 2015, para. 1). Johnson goes on to state

that for "every 1 percentage point change in the unemployment rate from May to May, community colleges can expect a 2.5 percent change (up or down) in fall full-time enrollment" (2015, para. 9). In the current time of enrollment downturn, focusing on providing courses in a format that is easily accessible for students to enroll and attend, like those online, is of utmost importance.

The community college population is unique in higher education, consisting of many nontraditional students with family and job obligations. These students need access to nontraditional learning opportunities like those offered in distance education. Meeting the demand for online offerings while ensuring online courses are high quality, offering the same opportunity for student learning and success as traditional courses is critical. Community and technical colleges are a pivotal site for investigating methods to improve student success in the online courses offered as national trends show an increase in online offerings at these schools over the last decade as well. Improved student success benefits the student, but also leads to higher program completion rates and ultimately greater success for institutions.

I chose student motivation as a target to influence the lower success and higher withdrawal rates I am seeing. For this research, motivation is defined as a student's desire to participate in the course, complete coursework and ultimately achieve success in the classroom, whether online or in a traditional face-to-face setting. Research links student motivation and student persistence to success in a course (Poellhuber, Chomienne & Karsenti, 2008; Hartnett, St. George & Dron, 2011). Based on those findings, it is logical to assume increased student motivation could affect a positive change on student

success and attrition, resulting in higher grades and lowered withdrawal rates in online courses.

Poellhuber et al. (2008) suggest a link between lack of communication and isolation (which are frequent factors in distance learning) to lowered motivation by stating, "motivation may also decline when learners feel isolated" (p. 44). In looking at the effect of student motivation in online courses through the framework of self-determination theory, Hartnett et al. (2011) found motivation is a contributing factor to student success in online courses and lack of motivation is linked to high withdrawal rates often seen in online student populations.

As an educator teaching online college-level biology courses, I suspected instructional strategies could increase motivation and have the potential to improve student success and lessen withdrawals in my online classes. The short duration of this study did not allow me to measure student success or withdrawal rates over the entire semester of the course. I therefore chose to determine if a change in instructional methodology would increase motivation, with the mindset that increased motivation could lead to lower withdrawal rates and overall greater student success, as motivation has already been linked to persistence and student success in the literature (Hartnett, et al., 2011; Poellhuber, et al., 2008).

Problem of Practice Statement

The Distance Learning Institute (DLi) at BTC (Beachside Technical College) (pseudonym) has compiled data indicating withdrawal rates are higher and success rates are lower in hybrid and online courses in comparison to their traditional counterparts (Hoppe, 2016). Table 1.1 shows the comparison of success rates for biology courses

offered in the traditional and hybrid formats in the fall 2015 and spring 2016 terms. A student is successful in a course when their final grade is a C or better. The numbers shown are percentages of all students enrolled in the course. Table 1.2 shows a comparison of withdrawal rates for all science department courses offered in the traditional and hybrid format in fall 2016 and fall 2017 semesters.

Table 1.1 Comparison of Student Success in Select Biology Courses in Fall 2015 and Spring 2016 in Traditional Courses and their Hybrid Counterparts

Success Rate Fall 2015				
	BIO 101	BIO 112	BIO 225	BIO 210
Traditional Success Rate	65**	59	93	71
Hybrid Success Rate	44	34	79	56
Success Rate Spring 2016				
	BIO 101	BIO 112	BIO 225	BIO 210
Traditional Success Rate	68	53	88	69
Hybrid Success Rate	56	60	74	51

**Notes.* *Success denotes a student earning a C or better in the course. **Numbers are shown as percentages of total students enrolled in the course

The discrepancy in success and withdrawal rate is evident in Biological Sciences I (BIO 101) hybrid courses I have been teaching for many years. In a hybrid course, students complete the lecture portion of the course online and then meet for a traditional lab session weekly. Student success in this introductory level course is critical for student retention and program completion, often students who fail introductory courses grow discouraged and ultimately do not make it to graduation.

Table 1.2 Comparison of Student Withdrawals in all Science Department Courses in Fall 2016 and Fall 2017 in Traditional Courses and their Hybrid Counterparts

Withdrawal Rate Fall 2016			
	Total Enrolled	Withdrawals	Withdrawal Rate
Traditional	1097	186	17%
Hybrid	331	95	28.7%
Withdrawal Rate Fall 2017			
	Total Enrolled	Withdrawals	Withdrawal Rate
Traditional	1371	223	16.3%
Hybrid	378	119	31.5%

In the BIO 101 hybrid course, there is often a higher withdrawal rate than in its traditional counterpart. When students are completing courses online, isolation is a potential barrier "in the online environment, where the challenges of lack of synchronicity (not being online at the same time) and lack of placedness (not being in the same geographical location) have to be overcome" (Dixson, 2015, p. 144). I question whether this isolation contributed to a lack of student motivation and ultimately affected a student's success and persistence in classes online. Breaching this isolation barrier is necessary to increase student motivation in the online environment; ultimately having a positive overall effect of increasing student success and lowering withdrawal rates. I addressed the problem of isolation by introducing collaborative activities in the online portion of the course in an effort to see if requiring students to collaborate introduces a social element, thus increasing their motivation, and ultimately leading to greater success and persistence.

Research Question

- **Research question one.** To what extent will the introduction of collaboratively constructed discussion board posts in a hybrid biological sciences course at a technical college affect student-participant motivation?
- **Sub-Question A.** If student-participant motivation is influenced, what type of motivation, extrinsic or intrinsic, is affected?
- **Sub-Question B.** What are student-participant perceptions of collaboration in an online class after completion of the collaborative activity?

Purpose of the Study

The purpose of the present action research study was to determine if collaborative learning activities in a hybrid course would increase motivation of student-participants in accordance with the identified problem of practice (PoP) for this Dissertation in Practice (DiP). Collaborative learning has been implicated as a tool to increase student motivation (Abrami, 2011; Donaldson & Bucy, 2016; Jagannathan & Blair, 2013; Leow & Neo, 2016). Most research has focused on its application in traditional classroom settings, but this study assessed the effects of collaboration in an online classroom environment. The online lecture portion of a college BIO 101 hybrid course was used to employ a collaborative learning activity requiring student-participants to work together to synthesize graded discussion board posts. Student-participant success rates and withdrawal rates, two variables found to be negatively affected in the online classroom (Garman & Good, 2012), were shown to improve when student motivation increases

(Donaldson & Bucy, 2015; Ryan & Deci, 2000; Radovan, 2011). The long-term outcome I am seeking is improved student success rates and withdrawal rates when student motivation is increased.

Conceptual Framework

This following section will present the concepts underpinning the focus of this action research study, collaboration, motivation, and online coursework in higher education. The conceptual framework will present a discussion of each of these constructs to build a foundation for the design of this action research study. Additionally, I will strive to illustrate clearly the connections between these three constructs, which led to the design of this study implementing collaboration in an online course in an effort to influence motivation positively.

Distance learning in higher education. There is a trend of increased demand for online and hybrid courses in higher education. Recent data shows that 32 percent of all college students are enrolled in at least one online course, a marked increase from the slightly less than 10 percent of students taking online classes in 2002 (Allen & Seaman, 2013). While higher education institutions see online courses as a cost-effective strategy to increase enrollment, students enroll in online courses to meet the demands of anytime, anywhere educational requirements, allowing higher education students to complete coursework from any location at any time. Higher education is adapting to meet the needs of students who have barriers preventing them access to traditional face-to-face

courses, allowing students to attain a degree despite the inability to attend traditional classes.

BTC has increased its online offerings as the demand for online courses has risen, but success and withdrawal rates in online and hybrid courses do not match traditional formats at the college (Hoppe, 2016). Other colleges found similar discrepancies in success and withdrawal rates. Garman and Good (2012) reported at a two-year community college, biology "students in the face-to-face sections tended to have higher success levels than students in the online sections as measured by final course grade" (p. 184). They also saw "online sections tended to have significantly higher attrition rates than the face-to-face sections" (Garman & Good, 2012, p. 186). This coincides with what is currently being seen in online science courses at BTC.

Contrary to these findings, multiple studies have indicated there is no difference in success rates in online classes versus traditional classes (Bernard et al., 2004) and still others have pointed to increased success in the online format (Feintuch, 2010). "According to a 2009 study conducted by the U.S. Department of Education, which reviewed more than 1,000 studies conducted on online learning between 1996 and 2008, students performed better in an online education situation than in face-to-face situations" (Feintuch, 2010, p. 20). The study, a large meta-analysis, included studies in k-12, higher education and the corporate realm, and cited increasingly engaging learning environments and instructional practices that contributed to better academic performance. The U.S. Department of Education stated that purely online instruction was equally as effective as face-to-face instruction, but blended learning formats that included traditional and online instruction produced stronger learning outcomes than either face-to-face or

online formats (Means, Toyama, Murphy, Bakia, & Jones, 2009). However, the researchers themselves state the meta-analysis utilized studies that were primarily small in scope. The researchers go on to state, "in recent applications, online learning has been modestly more effective, on average, than the traditional face-to-face instruction with which it has been compared" (Means, et al., 2009, p. 51). The data from BTC is certainly not consistent with these findings; BTC online students are less successful than their face-to-face counterparts.

The discrepancies in research findings and BTC data indicated instructional methods in online classes might be a critical factor in determining student success and preventing withdrawal. If an educator employs certain instructional strategies shown to improve student motivation, equitable rates of success and persistence in these classes may be achievable, but conclusive research on what works, and what does not, in the online environment is hard to come by. Delahunty, Verenikina, and Jones (2014) assert the lack of research in pedagogies appropriate to apply in the online environment can be seen by the sheer number of articles published documenting issues occurring in online education. As online offerings continue to increase, higher education institutions must focus more research on what tools can be employed to help students be successful in these courses.

Student motivation. Donaldson and Bucy (2016) posit key indicators of success in the modern age of digital learning are engagement and motivation. Motivation, based on the Latin verb to move (movere) is an individual's desire to do something, the force that will keep a student engaged in coursework and dedicated to academic success. Collaboration introduces a social element to the potentially isolated online learning

environment, which may bolster student motivation. Social cognitive theory supports the notion that social interaction can influence cognitive and affective processes, positively influencing a student's motivation and promoting academic success (Hartnett et al., 2011).

Motivation can be subdivided into extrinsic motivation, doing something to achieve an outcome, like a score on a test, and intrinsic motivation, doing something to achieve internal satisfaction or enjoyment (Ryan & Deci, 2000). Extrinsically motivated students value the outcome of an activity, whereas an intrinsically motivated student will value the process, its enjoyment, or perceived value. Radovan (2011) found increased motivation, intrinsic or extrinsic, in more determined students had a positive correlation with increased scores on exams. It has also been shown quality of learning will be elevated if intrinsic motivation rather than extrinsic motivation is increased because the student is personally invested and interested in the material (Ryan & Deci, 2000).

Unfortunately, elevating intrinsic motivation in a science course may not be a possibility for all students. Many students at BTC are taking a biology course as a natural science requirement for an Associate in Arts or Associate in Science degree, not because they have a passion for biology. Therefore, elevation of extrinsic motivation is often a more attainable goal for an educator, and the impacts of elevated extrinsic motivation should not be ignored. Extrinsic motivation has been linked to increased levels of ritual engagement, which can keep a student enrolled in a course and lead them to success (Nayir, 2017). Ryan and Deci (2000) cite multiple studies that implicate increased extrinsic motivation in "greater engagement (Connell & Wellborn, 1990), better performance (Miserandino, 1996), less dropping out (Vallerand & Bissonnette,

1992), higher quality learning (Grolnick & Ryan, 1987), and greater psychological well-being (Sheldon & Kasser, 1995), among other outcomes" (p. 63). This research will attempt to qualify any increases in motivation as extrinsic or intrinsic to understand further the implications of collaboration on motivation.

Student engagement is a phenomenon that fosters student learning, facilitates academic achievement, and is a predictor of student success (Nayir, 2017). "The more students engage themselves in academic activities, the more they will be successful" (Nayir, 2017, p. 60). Engagement and motivation are positively correlated, indicating that an increase in student engagement will increase motivation (Weber, 2003). Essentially, if a student is interested in the course, the content, or even a specific task, they work harder to be successful in the course. Bolkan (2015) states, "If instructors can get students engaged in the topics being covered in the course, they may find their students more intrinsically motivated to pursue their studies" (p. 83). I am hopeful collaboration involving social interaction can tap into engagement for some students otherwise not engaged simply with the material.

It has also been shown motivation can be influenced by social interaction in an online course. "Social interaction helps build trust and familiarity with others, potentially affecting students' feelings toward the learning experience with some impact on motivation" (Delahunty et al., 2014, p. 251). Social interaction through collaboration in an online course could potentially be utilized to build a learning community. Delahunty et al. (2014) posit a community is based on what the members are participating in as a group, the common activity. The mutual activity, in this case, would be collaboration through group synthesized discussion board posts. If a community atmosphere is

developed where students interact and work together to achieve a common purpose, the isolation barrier online students face may be breached, and students could become more engaged and more motivated, resulting in greater success.

Collaborative learning. Collaborative learning provides an opportunity for discourse amongst students through their interactions and promotes students learning from each other. "Collaborative learning is a pedagogical approach wherein learning takes place via social interaction by the sharing and construction of knowledge among participants" (Jong, 2016, p. 195). The introduction of instructional methodologies that require social interaction amongst learners may be even more critical in the distance learning environment where interaction is often limited by temporal and geographical factors. Delahunty et al. (2014) refer to Vygotsky's work stating, "Interaction from a sociocultural perspective refers to both the individual and collective transformation of knowledge occurring through dialogic exchanges between people" (p. 245).

The introduction of collaboration in an online course has the potential to advance learning, can minimize isolation that learners feel in online courses. Jagannathan and Blair (2013) reaffirm the benefits of collaboration in online learning by stating activities "that have been found to create a positive student outcome include participation in collaborative learning activities" (p. 3). These findings prompted me to choose collaborative learning as an instructional strategy with the potential to influence student motivation and therefore promote student success.

All too often, distance learning classes lack the social interaction found with collaborative learning activities. It is common to see discussion boards in use in online classes; I have been employing discussion boards in my online classes for many years.

What I find with the requirement of discussion posts and subsequent replies to classmates is quality social interaction leading to authentic construction of knowledge is not the norm. More frequently, I find students submitting shallow replies, which do not advance the academic conversation. Additionally, they are not effective in collaborating with classmates and do not engage in authentic construction of knowledge as students are not collaborating to construct knowledge together, and therefore their interaction is at a surface level at best. Constructing discussion posts as a group will foster deeper social interaction and meet the requirements of social constructivist approaches.

The benefits of collaboration are grounded in the theory of social constructivism. "A social constructivist view of learning emphasizes the role and nature of interaction with others to challenge what is known, enhance connections with existing knowledge and build new pathways for additional ideas" (Bryant & Bates, 2015, p. 17). Social constructivism states learning benefits result from the social interaction amongst learners, which occurs in collaborative learning, and instructional activities that involve collaboration. Conversely, research has shown learning can be adversely affected by a lack of social interaction, which can be commonplace in the distance-learning environment (Dixson, 2015). Almajed, Skinner, Peterson, and Winning (2016) state collaborative learning (CL) "has advantages over other learning methods, such as sharing learning experiences; learning information-searching skills; having peer support; learning presentation skills; having authentic opportunities; providing opportunities for cognitive conflict within a CL team, which encourages learning" (p. 68).

If collaboration can be employed effectively in the online format, it has the potential to transfer these advantages to online students prone to isolation. Collaboration

will provide an opportunity for students to share their learning experiences and support each other, fostering a support system that has the potential to affect their motivation positively.

Donaldson and Bucy (2016) showed that using a collaborative project involving the construction of meaningful artifacts within an online course led to an increase in student motivation. Abrami, Bernard, Bures, Borokhovski and Tamim (2011) reference the work of Bernard et al. (2009) who found "designing interaction treatments into DE [distance education] courses… with peers impacts positively on student learning" (p. 86). Students have the opportunity to be "exposed to multiple perspectives of learners" when completing a project or assignment through collaboration, which leads to higher order thinking and more authentic learning (Kerr, 2010, p. 230). Student to student relationships can be strengthened by collaboration within a course and this can promote participation, leading to an increase in achievement in the course (Leow & Neo, 2016). Abrami et al. (2011) assert, "The next generation of interactive distance education, or purposeful, interactive distance education, should be better designed to facilitate interactions that are more targeted, intentional, and engaging" (p. 87). All of these research findings indicated the introduction of collaborative learning activities into an online biology course could promote student-to-student interaction, authentic learning, participation, and ultimately success for online learners.

Action Research Methodology

Action research is research conducted by a practitioner at the site of the identified problem of practice and is immediately applicable to the learning environment being studied. Its intent is to foster reflective practices, allowing teachers to find relevancy and

significance in findings (Choi, 2011). This section will briefly describe the methodology employed in this action research study, including a description of the teacher-researcher, research site, and research design.

I, the teacher-researcher, am a faculty member at Beachside Technical College (pseudonym, BTC) which served as the site of this action research study. I possess a Bachelor's of Science degree in biology & chemistry and a Master's of Science degree in molecular and cellular biology. I have taught at the college for twelve years, the past eight years teaching majors BIO 101 (Biological Sciences I) in the hybrid format. The population of BIO 101 students is primarily Associate in Science students who are enrolled in health science emphases and are taking the course as a pre-requisite for required anatomy and physiology courses, Associate in Science transfer students, as it is university parallel, or lastly Associate in Arts students who are taking the course to fulfill a natural science requirement. The course surveys biology from the atomic and molecular level through cell structure and function, genetics and ends with DNA structure and expression. The maximum enrollment in the hybrid course is 22 students.

Research site. BTC is a two-year Community and Technical College located in northeastern South Carolina. The college has three campuses that have been serving the local communities for 50 years. The published mission of the college, is to provide post-secondary, vocational, technical, and occupational programs that lead directly to securing or continuing employment; associate degree programs that enable students to gain access to other post-secondary education; and personal interest classes, programs, and services

that meet the job training, occupational advancement, and lifelong-learning needs of the residents and employers in its service area.

According to data published by the research site, the college enrolls 7,750 to 9,500 college-credit-curriculum students and provides continuing-education programs for 8,000 to 10,000 participants per year. The student demographics at the college are 71% of the student body is White, 20.3% is African American, 1.8% is Hispanic, and 0.7% is Asian, while 6.2% identify as other. Currently 43% of students are full time and 57% are part time.

The college offers more than 80 associate degrees, diplomas, and certificates. The largest population of students at the college is on a general education track, seeking an Associate of Arts (AA) or Associate of Science (AS) degree. A large portion of the student body in AA or AS pick an emphasis such as nursing, physical therapy assisting, business, or accounting. Many students also choose BTC as a path to transfer to a senior institution to obtain a bachelor's degree. The college's overall goal to promote "economic and personal development through affordable high-quality educational and training programs" is published on the website.

Currently BTC offers 280 courses in the online and/or hybrid format, which equates to 38.7% of all courses offered at the college. Over the last six years, there has been a 156% increase in the number of courses the college offers in online or hybrid formats. BTC is second in the state of South Carolina in terms of the number of online courses our students take. Unpublished internal data has shown an overall success rate of 68.2% in online classes is seen in comparison to the 75.8% success rate that occurs in courses taught in the traditional format at the college. This discrepancy in success rates

shows the necessity of research into interventions resulting in equivalent success rates in traditional and online courses; this action research study was designed to meet this need by employing a collaborative learning instructional strategy in an effort to promote student success through motivation in online courses.

Research design. Kerr (2010) found the most influential tools in facilitating intentional and engaging learning were the use of discussion boards and blogs. This action research study introduced collaboratively created discussion board posts in an effort to determine if the introduction of collaboration increased student motivation. Due to the nature of using intact course sections, randomization was not possible; this was a quasi-experimental, quantitative design, using a pretest-posttest methodology. Quantitative data was collected in the form of student-participant grades on submitted discussion posts and scores on questions derived from the motivation section of the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia, & McKeachie, 1991). Quantitative data was also collected to assess student-participant perceptions of collaboration in an online course after participating in the collaborative activity through a questionnaire provided to students at the conclusion of the study.

To address research question one and sub-question A, a pretest-posttest design was used. Questions derived from the section of the MSLQ measuring motivation and assessing the orientation of motivation (extrinsic or intrinsic) were administered initially after student-participants completed independent discussion posts in the first three weeks of the course. In response to a prompt I provided, independent discussion posts were submitted to the learning management system used for the course, Desire to Learn (D2L). Students were required to reply to classmate posts as the only means of interaction on the

discussion board. Achievement data on the discussion posts was recorded as an anonymous number grade on a 0-100 scale.

I randomly assigned student-participants to small groups, of three to four students, in order to create a collaborative discussion post. Their collaborative interaction was conducted using the Google Docs platform, which allowed all student-participants to contribute to posts. After the collaborative discussion posts were submitted, grades were again recorded as an anonymous grade on a 0-100 scale. Subsequently, motivation was reassessed by readministering the MSLQ after two weeks of collaborative discussion posts.

Motivation survey results after completing independent posts were compared to results after completing collaborative posts. This comparison was utilized to search for changes in motivation after student-participants collaborated with classmates. Additionally, the orientation of motivation was evaluated. I compared grades on the independent and collaborative posts utilizing a pre-established grading rubric provided to the students, to determine if achievement was affected by collaboration, and examined grades by looking at differences in grades for the two styles of discussion post.

It was logical to assume some student-participants may do significantly better on the group posts due to other student-participants in the group completing the work. To address this issue, a rubric was used to grade all discussion posts submitted, either individually or collaboratively, but the collaborative assignment rubric factored in a percentage of the grade based on student-participants within the group grading their fellow group member's effort and participation. Secondly, I looked at the average grade

change from individual posts to collaborative posts for the class as a whole to minimize this effect.

I often face resistance from students taking the course in the traditional format when I introduce activities requiring collaboration, but this resistance is often followed by a positive perspective of the collaboration once the activity is complete. I was curious to see if this same resistance is exacerbated for online learners as they tend to be independent learners and may find the requirement of "working together" to be contrary to their motivations for taking the class in the online format. At the conclusion of the project, student-participants were given an anonymous questionnaire to assess their perceptions of collaborative activities in online classes, addressing sub-question B. Questions were designed to assess if their perceptions changed after taking a course that required collaboration and whether or not the students themselves felt the collaborative learning activity was beneficial.

I often face resistance from students taking the course in the traditional format when I introduce activities requiring collaboration. This resistance is often followed by a positive perspective of the collaboration once the activity is complete. I was curious to see if this same resistance is exacerbated for online learners as they tend to be independent learners and may find the requirement of "working together" to be contrary to their motivations for taking the class in the online format.

Ethical concerns. A "primary responsibility" of the teacher-researcher is ensuring any action research study "adheres to ethical standards" (Mertler, 2014, p. 106). Ethics, the concept of what is morally correct or incorrect, is the focus of the National Education Associations Code of Ethics, which guides educators in their practice. The

Code states, “The desire for the respect and confidence of one's colleagues, of students, of parents, and of the members of the community provides the incentive to attain and maintain the highest possible degree of ethical conduct” (National Education Association, 2015, para. 3). As this was my responsibility, I organized and detailed my research design and implementation to avoid any ethical violations as they have the potential to negate significant findings from this action research study.

To maintain these standards of ethical conduct, student-participants were fully informed of the nature of the research, adhering to the principle of accurate disclosure. Informed student consent forms were collected from all student-participants and parent consent forms were employed if a student-participant was under the age of 18. Student-participants were notified if they chose not to participate in the study; it would in no way affect their success in the course. Additionally, in an effort to maintain confidentiality and limit student-participant apprehension about participation, MSLQ submissions were denoted only with randomly assigned student identification numbers and student-participant perception surveys were fully anonymous. Discussion post scores were collected as anonymized data as well. I also sought and obtained approval to conduct the study through Department of Institutional Research at BTC as well as the Institutional Review Board at the University of South Carolina.

Potential weaknesses. A limitation of this study was the short period of data collection. Due to the requirement of data collection to be completed in eight weeks, final course grades could not be included as a measure of overall course success in this study, nor could withdrawal rates for the course be measured as this course runs for a full fifteen-week semester in spring and fall terms. Final grades and withdrawal rates were

collected at the end of the semester after data collection concluded to compare these rates to a section of the course taught with only individual activities to promote further reflection on the success of the collaborative discussion posts.

The small sample size and inability to assign student-participants to random sections were also weaknesses of this study. BTC only offered two sections of BIO 101 in a hybrid format the semester this study was conducted, due to enrollment. However, the teacher-researcher plans to continue using collaborative activities through a full fall and spring semester rotation to obtain significant data for comparison to a year where no collaborative activities were employed. This study was conducted understanding the results of this action research study were not applicable to a larger population; they apply only to this BIO 101 course taught by this teacher-researcher.

The validity of the measurements, the construct validity, was carefully considered in this study. Construct validity is the "approximate truth of the conclusion that your operationalization accurately reflects its construct used in this study" (Trochim, 2006a, para. 4). It was essential the survey, which measured student motivation was appropriate to ensure what was being measured was actually the construct of motivation. In an effort to bolster construct validity, questions were used from an established student motivation survey, the MSLQ. There is significant research pointing to the reliability and validity of the instrument as a measure of motivation. The coefficient alphas of the scale items measuring student motivation, presented in chapter three, demonstrate strong reliability, specifically internal consistency (Pintrich et al., 1993).

Due to the nature of a pretest-posttest experimental design, another potential concern was the threat of repeated testing on internal validity. Internal validity is "the

approximate truth about inferences regarding cause-effect or causal relationships" (Trochim, 2006b, para. 1). The MSLQ (Appendix D) assessing motivation was administered as a pretest after individual discussion posts and as a posttest after collaborative posts was completed, which could have resulted in students being sensitized to the questions of the survey. This is an unavoidable limitation of a pretest-posttest design.

Lastly, because student-participants knew they were participating in a research study, this provided an opportunity for student-participants to provide biased answers, formulating answers to survey questions that may be based on what they perceived the teacher-researcher's expectations to be. This could lead to inaccurate conclusions being drawn, however, the use of randomly assigned student numbers for MSLQ submissions and anonymous student perception surveys attenuated this. Additionally, in an effort to minimize the influence of this bias, I informed all students their participation in the study was voluntary and their survey responses and grades collected as data were anonymous, their participation in no way impacted their success in the course.

Dissertation overview. This chapter introduced the identified problem of practice of this action research study. It also established the research question, purpose of the study and introduced the theoretical underpinnings of the research project. An introduction to the research methodology, ethical concerns, and potential weaknesses has also been provided. Chapter two presents a thorough review of the literature in the areas of distance learning demand and student success and attrition rates, the effects of isolation in an online environment, student motivation, and collaboration as an instructional methodology in online courses. Chapter three details an account of the

research design, as well as the plan for data collection and analysis. Chapter four provides a description of the data that was collected and a discussion of the findings. Lastly, Chapter five is a discussion of the interpretation of the data collected in the study and the implications of the findings. The significance of the findings is reviewed and future research suggested.

Significance of the study. Students in higher education frequently face roadblocks to attending classes, including work commitments, family obligations, and geographical isolation. "The lack of opportunities for access and success in education deprives some people of the opportunity to partake in the benefits" which can lead to social injustice and inequity (Chikerema, Chikari, & Chikerema, 2016, p. 52). The National Academy of Public Administration (n.d.) includes "the fair, just and equitable management of all institutions serving the public directly or by contract; the fair, just and equitable distribution of public services and implementation of public policy" in its definition of social equity (para. 2). It is of primary importance access to higher education, as well as the opportunity for academic success is equal, whether a student is attending on campus or online.

Makhanya, Mays, and Ryan (2013) assert an advantage of distance education courses "is that they can provide access to education opportunities for those who might otherwise be marginalised by work, ethnic, geographical or other factors, such as physical disability or age – thus uniting development and social justice concerns" (p. 1385). This advantage is what is driving the increased demand for online courses seen at BTC and across the nation. It is not enough for institutions to offer more online courses to meet this demand without investigating whether student success in the online format is

equitable to student success in face-to-face courses.

By providing quality education in an entirely online or blended (hybrid) format, colleges and universities are meeting a need for social equity in higher education. However, the same techniques employed in delivery of a quality traditional course cannot be directly applied in an online environment with guaranteed success. In addition, it must not be overlooked that simply providing students with access to education does not address their ability to be successful. Many factors including student preparedness, student support, instructional methods, and student motivation contribute to whether a student is successful in an online course. It is the duty of the educator to seek to improve one's practice in order to promote student success.

The significance of this study is the examination of an instructional technique's effect on motivation of students in an online BIO 101 course taught at a technical college, in an effort to increase student success and reduce withdrawal. As the teacher-researcher, I sought to determine if collaboration could increase student motivation if used as an instructional method in a hybrid BIO 101 course. Dana and Yendol-Hoppey (2014) assert that "working in the best interest of the students you teach means carefully and systematically investigating your teaching and the relationship it has to your own students' learning" (p. 149). Identifying techniques to promote motivation have potential to lessen the identified gap in success and withdrawal rates seen between online and traditional courses at BTC. These findings have could benefit my students' success directly providing better outcomes for them, not just in this course, but overall in completion of their programs and ultimately timely graduation.

Key Concepts

Attrition – occurs when a student does not complete a course (withdraws) or does not return for a subsequent semester and has not yet graduated. Essentially this is a reduction in the number of students enrolled and retained by the institution semester-to-semester (Boton & Gregory, 2015).

Asynchronous communication – communication between individuals that does not occur in real time. Modes of delivery for asynchronous communication in online courses include email, discussion posts and recorded commentary (Watts, 2016).

Collaborative learning – "Collaborative learning is an educational approach to teaching and learning that involves groups of learners working together to solve a problem, complete a task, or create a product" (Laal & Ghodsi, 2012, p. 486).

Distance education/learning – courses using technology to deliver instruction to students at a distance without the requirement of their physical presence at regularly scheduled on-site school meetings, utilizing the internet to provide synchronous and/or asynchronous communication to deliver course content, student assignments, and assessments (Allen & Seaman, 2013).

Engagement – Engagement "represents both the time and energy students invest in educationally purposeful activities" (Kuh, Cruce, Shoup, Kinzie & Gonyea, 2008, p. 542). "Engagement results when the student's involvement in learning (such as participating in a discussion or collaborating on solving problems) contributes to their learning and sustains their further involvement in course activities" (Student Engagement in Online Learning: What Works and Why, 2014, p. 6).

Hybrid course – a course with a blend of traditional instruction in a physical classroom at designated meeting times with online instruction. Currently at BTC, the requirement for a course to be a hybrid is that 40-60% of the instructional time is delivered in a traditional format.

Learning management system (LMS) – a web based software platform used to deliver course materials, track grades, and attendance, administer quizzes and exams, submit course assignments, and provide venues (chat, email, discussion) for communication amongst students and between student and teacher. BTC uses Desire2Learn (D2L) as its LMS.

Motivation – applies to a student's desire to be successful in a course through studying course material, participating in the course, and completing course activities. Motivation can be extrinsic, simply for the desire of an outside reward such as a grade, or intrinsic due to a student's personal enjoyment of the course or the material (Ryan & Deci, 2000).

Netiquette – BTC's website states "'Netiquette', a condensation of the words "network" and "etiquette", is the term commonly used to refer to conventions adopted by Internet users on the web, mailing lists, public forums, and in live chat. By being aware of these conventions you can ensure that your interactions online stay positive, friendly, and informative."

Online course – a course offered fully online, never requiring a student to attend on-site meetings, providing a distinct convenience advantage for the student (Allen & Seaman, 2013).

Success – for the purpose of this study, is defined as a student successfully completing a course with a passing grade of a C. In the case of Biological Sciences I, which is an

entry-level course needed as a pre-requisite for more advanced courses, the minimum grade to be successful is a 70%, which is a grade letter of C to progress to more advanced courses.

Synchronous communication – communication between individuals that occurs in real time. Modes of delivery for synchronous communication in online courses include web conferencing tools like Skype, Google Hangout, GoToMeeting, as well as telephone communication (Watts, 2016).

Traditional course – a course that delivers all instruction through regularly scheduled in-person meetings.

University parallel course – BTC defines a parallel course as one that will transfer from a technical or community college to a university based on statewide transfer agreements developed at the state level for use amongst state institutions.

Withdrawal – the process of removing a student from a course prior to the completion of the course, which can be initiated by the student after add/drop, but before the two thirds point of the semester, or initiated by the faculty member at any time. The impetus of withdrawal can range from personal or health reasons for the student, poor academic performance, excessive absences, or a multitude of other causes.

Conclusion

The action research study topic of this DiP sought to increase the motivation of students in an online lecture of a BIO 101 course at a technical college through the introduction of collaborative discussion posts. Utilizing an action research strategy provided a scenario where findings were immediately applicable to the courses I teach at BTC, which is where the discrepancy in student success and persistence was identified.

As distance education steadily rises as a flexible and convenient option for students, and a financial lifeblood for institutions, educators must continue to investigate and address the discrepancies seen in success rates in online courses compared to their traditional counterparts. A course offered in a traditional format cannot simply be placed online for students to access and result in the same levels of student success; this is evidenced by what we see at BTC.

The human element of social interaction has been shown to be a key component in student learning and student motivation. This may be a viable pathway to increase student success in online classes by the incorporation of activities involving student collaboration. Increased motivation was hypothesized to be a potential improvement point in the identified problem of practice, which are lower student success rates and higher withdrawal rates in online courses in comparison to their traditional counterparts at BTC. If the increase in demand for online classes continues, more and more courses will be offered at a distance, and we must identify tools and techniques that allow students to meet the same learning outcomes at the same rates of success even while attending class online.

CHAPTER TWO

LITERATURE REVIEW

This chapter presents a comprehensive review of the literature as it relates to the variables of this action research study. Particular attention will be paid to the constructs that are at the focus of this investigation, including collaboration, motivation, and distance learning in higher education. This chapter provides the historical foundation and the theoretical framework of the problem of practice using published evidence from the literature.

The problem of practice serving as the focus of this action research study is the discrepancies in success and persistence of higher education students in online courses in comparison to their traditional counterparts. Numerous studies have shown lower success and higher attrition (withdrawal) rates in online college courses (Boton & Gregory, 2015; Garman & Good, 2012; Hachey, Conway & Wladis, 2013; Phirangee, 2016). I have seen discrepancies in student persistence and achievement firsthand in the online lecture portion of the hybrid Biological Sciences I (BIO 101) course I teach at BTC. Without exception, the withdrawal rates are higher and academic achievement, evidenced by course grades, is lower in the BIO 101 online than in its traditional counterpart.

Despite these discrepancies, there is a steady increase in the number of students taking online courses exclusively, or as part of their instructional load, in higher education; a trend that has persisted for over a decade (Allen & Seaman, 2013). To

promote better educational experiences in the online realm, it is necessary to investigate factors contributing to discrepancies in persistence and success, and instructional practices that have the potential to narrow the gap. The focus of this research study was to employ an instructional method to affect online student motivation. Successful students who persist to finish courses were found to be more motivated than students who withdraw or do not pass courses (Bolkan, 2015; Deci, Koestner & Ryan, 2001; Radovan, 2011; Ryan & Deci, 2000; Weber, 2003). When students are motivated, they are more involved in the course curriculum, invested in performing well, and more likely to persist (Bolkan, 2015; Ryan & Deci, 2000). As motivation has been shown to be higher in students who achieve higher grades and those who finish courses, it was chosen as the dependent variable of the study. Increasing student motivation should lead to greater success and lower attrition.

The independent variable of this study, the introduction of collaboratively constructed discussion posts was chosen as an instructional method to foster social interaction through collaboration. Collaboration has been shown to correlate positively with student motivation (Donaldson & Bucy, 2016; Leow & Neo, 2016; Poellhuber, Chomienne & Karsenti, 2008). In an online environment, the effects of isolation can have a negative impact on students contributing to a lack of motivation (Dixson, 2015; Poellhuber et al., 2008). When students feel connected with other learners, which can occur when they construct assignments collaboratively, an increase in student motivation is possible (Donaldson & Bucy, 2016).

The research question investigated in this action research study was to what extent introduction of collaboratively constructed discussion board posts in a hybrid science

course could affect student-participant motivation? In addition, if student-participant motivation was influenced, what type of motivation, extrinsic or intrinsic, was affected? Additionally, student perception of the collaborative activities was investigated.

This chapter begins with a description of the purpose of the literature review as an essential element in building the basis for the action research study and the procedure utilized to conduct the review. Additionally, research supporting the identified problem of practice is reviewed to provide the necessary background information utilized to formulate this intervention strategy. A detailed explanation of theoretical and historical perspectives on the growth of distance education, the role of motivation in learning, and the effects of collaboration on student performance and motivation are included. Through this literature review, the study's variables are clearly defined.

Literature Review Process

The strategy utilized to compile the literature for this literature review involved a detailed search of educational databases for literature relating to the key constructs of distance learning/online education, motivation, and collaboration. Although Google Scholar, dissertations, and foundational textbooks were also utilized, the primary database source was the University of South Carolina's Thomas Cooper Library database collection. The databases I used most often were Education Source and ERIC, but JSTOR was also utilized. This led to the investigation of theoretical perspectives on motivational theory and social constructivism. As the literature was reviewed in these areas, a list of key names, linked to current and historical research, was maintained through a review of the associated bibliographies. Papers or materials found to be

pertinent were then built into a collection of one-page annotations for each potentially useful source.

Purpose of the literature review. This literature review is what Machi and McEvoy (2016) describe as a complex literature review. The complex literature review serves the purpose of reviewing the literature to understand the current knowledge about a particular area of study, and serves to show how this current knowledge supports a proposed research question or course of study. The result of a complex literature review is a proposed thesis that will outline a topic requiring further study (Machi & McEvoy, 2016). The literature review "will support the thesis position by building a case from credible evidence obtained from previous research" (Machi & McEvoy, 2016, p. 5). The literature review process is critical to action research to establish "a connection between your action research project and what others have said, done, and discovered before you" (Mertler, 2014, p. 61). It enables the researcher to develop expertise in the area of study enhancing the efficiency and effectiveness of the work (Mertler, 2014).

The literature review procedure. The literature review for this thesis initially began with a review of literature relating to student success in online courses in comparison to traditional courses. At BTC, data has indicated there are differences in attrition and success rates in online and hybrid courses in comparison to their face-to-face counterparts, with online learners showing higher attrition and lower academic success than their traditional counterparts do. The initial search was done to determine what other researchers found in this area, and multiple studies were examined to explore similar trends in institutional data.

After establishing differences in success and attrition rates are a common phenomenon in higher education, a search was conducted to determine what behavioral attributes have been repeatedly linked to persistence and academic achievement. Motivation was identified as a target variable through this search. Additionally, a key descriptor of online students seen was "isolated". Students working online are susceptible to isolation if the community environment possible in a face-to-face arena is not nurtured in the online setting (Dixson, 2015; Poellhuber et al., 2008). Current literature was reviewed in relation to online student's sense of community and levels of interaction. It is reasonable to assume isolation may be a factor, causing online students to feel disconnected and hindering the motivation necessary for their persistence and success.

Collaborative activities amongst online learners have the possibility of breaching this isolation (Bryant & Bates, 2015; Delahunty et al., 2014; Dixson, 2015; Donaldson & Bucy, 2016; Jagannathan & Blair, 2013). Current literature on the benefits of collaborative learning as well as the foundational theories of social constructivism was reviewed. The findings of this literature review will be outlined in the sections following as evidence for the claim that collaboration in online courses has the potential to affect motivation and lead to increased success and lower attrition rates.

Online Education

The following portion of this literature review discusses online education, beginning with a review of the history of courses offered outside of the traditional classroom setting. Advantages and disadvantages of coursework in the online format are discussed next. Finally, the issue of discrepancies in attrition and success in online

courses is reviewed. Particular attention is paid to what is reported in current literature for attrition and success rates in online classes compared to traditional classes, including potential causes for these discrepancies and predictors of attrition.

Historical perspectives. Online education has its roots in print correspondence courses that have been around since at least the 1830s in Europe and crossed the Atlantic to America in the 1870s (Schlosser & Anderson, 1994). "Students of the classical curriculum . . . corresponded monthly with teachers, who offered guided readings and frequent tests (Schlosser & Anderson, 1994, p. 2). These courses were the first classification of distance education (DE), a field of education where the student is physically distant from the instructor and the institution for the majority of the course. In DE, communication is all or primarily asynchronous and learning occurs through the transfer of materials from the educator to the student.

With the inception of DE, the comparisons of the success of students completing course work traditionally or at a distance followed. Schlosser & Anderson (1994) quote William Rainey Harper, a Yale Professor teaching correspondence courses in the late 1800s, who stated "The student who has prepared a certain number of lessons in the correspondence school knows more of the subject treated in those lessons, and knows it better, than the student who has covered the same ground in the classroom." The action research study at the focus of this dissertation is clear evidence that the inquiry into DE student performance is ongoing.

A steady expansion of DE has occurred since its inception, and as in any area of education, there has been great interest in methods of instruction utilized to maximize student learning. In the 1930s, at the University of Iowa, the use of television changed

the field of DE by allowing the instructor to use the visual and auditory medium to distribute a class experience (Schlosser & Anderson, 1994). By the 1950s, college courses were being offered at other Universities through this medium. In the 1970s, another landmark change in the history of DE occurred when the United Kingdom launched the Open University. This institution was a DE center providing degrees, not just course work through sophisticated teaching techniques including media use, which signaled a legitimization of the DE field (Schlosser & Anderson, 1994). The Open University, still in existence today, states on its website that it has provided an education to over two million students in over 100 countries worldwide through flexible and innovative instructional methods.

In its most recent form, DE has become primarily online education. DE moved to the realm of the computer in the 1980s, which was correlated to the development of microcomputer systems (Schroeder, Baker, Terras, Mahar, & Chiasson, 2016). Currently, DE courses are delivered using a computer or mobile device, often through a learning management system (LMS). The delivery can include a variety of web-based tools that allow the dissemination of course materials, submission of assignments, and communication platforms for student-student and student-teacher communication.

Advantages and disadvantages of online learning. Online courses meet the needs of students who cannot attend traditional face-to-face courses, just like their precursor, correspondence courses. Students with family obligations, work commitments, geographical barriers, or health issues often do not have the ability to travel to a university to take traditional courses. Online education opens the door for access to students who require a flexible location and schedule to meet their needs

(Chikerema et al., 2016). Providing quality online educational experiences that provide the same opportunities for success that are found in the traditional classroom, is an institutional goal of many colleges and universities due to the steady expansion of students interested in online coursework (Allen & Seaman, 2013).

In their review of online education from 2002 through 2012, Allen and Seaman (2013) state "the proportion of chief academic leaders that say online learning is critical to their long-term strategy is now at 69.1 percent – the highest it has been" (p. 4). The authors go on to document steady expansion in online course enrollment. "The number of students taking at least one online course increased by over 570,000 to a new total of 6.7 million" and the current "proportion of all students taking at least one online course is at an all-time high of 32.0 percent" (Allen & Seaman, 2013, p. 4). This steady growth demonstrates the demand for this form of educational delivery and necessitates the growing field of research into successful instruction in the online format.

Discrepancies in success rates of students taking online courses indicate there may be disadvantages to online course work, and reports from students themselves of what their online experiences are indicate wide variability in online experiences (Garman & Good, 2012; Hachey et al., 2013; Willging & Johnson, 2009). The lower retention rates are a central focus of many institutions who have expanded their online offerings, including BTC. Potential causes for the higher attrition rates "include, but are not limited to, lack of institutional support, lack of connection between the student and the institution, quality of interaction between the student and faculty, sense of isolation, disconnection, issues with technology, and student self-discipline" (Schroeder et al., 2016, p. 245). While I do not think lack of institutional support or connection between

the student and the institution are affecting my BIO 101 online students, due to the nature of the face-to-face lab sessions, I do think isolation, lack of self-discipline and technology issues are potential causes.

Higher attrition in online education can indicate an academic program is not of high quality. In the current day and age of marketing student successes to potential new students, it can also affect recruitment of future students (Willging & Johnson, 2009). In addition, accreditation processes in higher education include reporting student attrition and success rates. BTC is a regionally accredited institution, and as such, attrition and achievement statistics are reported through the accreditation process, having the potential to affect accreditation and potentially state funding as well. All of these possible outcomes indicate the importance of determining what online learners need to be successful and designing courses that meet these needs.

Attrition in online learning. Hachey, Conway, and Wladis (2013) cite a lack of empirical evidence of discrepancies in academic achievement and retention in online courses at the community college level. They assert, "In particular, community colleges lack awareness of student characteristics and enrollment patterns for online courses" (Hachey et al., 2013, p. 7); and sought to utilize institutional data over a decade to determine what, if any, discrepancies existed. The researchers found online courses have significantly higher attrition rates than traditional courses. They also state students who attempt online courses are typically higher overall GPA students, but those most at risk from withdrawing from an online class are those with a midrange GPA (two–three point five). Additionally, if a student had already completed one online course, they were much less likely to withdraw, and withdrawal rates were highest in elective courses

(Hachey et al., 2013). Of particular importance to this study is the researchers also found that attrition in STEM (science, technology, engineering, and mathematics) courses was significantly higher than in other disciplines. The course utilized for this study is a STEM course, and it does seem that the gap in attrition is higher at BTC in online STEM courses.

Garman and Good (2012) also investigated attrition in higher education at a community college. This research was particularly pertinent to this study due to its focus on success and attrition in college biology courses in traditional delivery compared to online delivery. The researchers found significantly lower success, as demonstrated by lecture grades, lab grades, and final grades, in the online delivery format (Garman & Good, 2012). In either delivery mode, mean grades were in the D range, illustrating that regardless of delivery, biological science courses at the college level are difficult for students. They were also able to confirm higher attrition rates in the online format, 22% online in comparison to 16% in the face-to-face sections (Garman & Good, 2012). Garman and Good assert that their findings "reinforced the notion that students may not be adequately prepared for the online course structure and withdraw after failing to pass the first and/or second exam (a time period which falls in the college's official withdrawal period)" (2012, p. 187).

As stated in chapter one, contradictory findings in relation to student success in online courses are plentiful; the following study is an example of this, finding no difference in online student success compared to traditional students. Fonolahi, Khan, and Jokhan (2014) looked at the success and persistence rates of students at the University of the South Pacific over the span of four consecutive years in an

undergraduate mathematics course. They cited multiple sources asserting students in online courses outperform students in the traditional format, as well as many conflicting reports stating the contrary was true, and traditional classroom achievement was higher. Their data indicated that of the students that persisted and completed the course, there was no significant difference in final achievement scores in the online environment in comparison to the face-to-face environment (Fonolahi et al., 2014). However, they did find a significantly higher attrition rate in the online courses, 15% in the online courses, and 3.9% in the traditional sections. They also reported a greater number and variance in the assessments in the online courses, meaning the online students were engaged in consistent assessment more than the traditional students (Fonolahi et al., 2014). Their findings affirm while there is conflicting data about student success in online courses, higher attrition rates in online classes is seen consistently.

Jaggars, Edgecombe, and Stacey (2013) provided a Community College Report of the outcomes of students in online courses, using data from a southern and a western US community college. They claim the large population of nontraditional students in the community college environment has attributed to the explosive growth of online education as institutions strive to meet the needs of this population. Students at community colleges in the US were more often higher achieving academically, white, English speaking, higher income, and "balancing multiple life demands" with their education (Jaggars et al., 2014, p. 1). Attrition rates were reported to be up to 13% higher in the online environment and that those students who did persist were up to 6% less likely to receive a passing grade in the course (Jaggars et al., 2014). Additionally,

students taking online courses were less likely to complete their degree than those taking a traditional course load (Jaggars et al., 2014).

To attempt to correlate factors that contribute to attrition, Willging and Johnson (2009) utilized a survey process to collect data from students who had withdrawn from an online education program in human resource education to evaluate what factors influence a student's decision to quit. They reported a 34% average attrition rate and found a student was more likely to quit after just the first few courses rather than later in the program. The researchers found students enrolled in the online program based on the reputation of the university, the desire to advance their education, and the convenience and flexibility of online education (Willging & Johnson, 2009). When assessing the dominant reasons for withdrawal, they found no single reason to be the culprit. What was identified was a variety of reasons including personal and professional issues, as well as program related reasons and technological difficulties. Often students stated a factor was the difficulty in taking course work while being working full-time (Willging & Johnson, 2009). Many students choose online classes because they are working professionals, this may mean the population of students in these courses will face this barrier more often than traditional students, which can contribute to higher attrition.

To determine if predictors of attrition could be identified, Shaw, Burrus and Ferguson (2016) implemented the SmarterMeasure Learning Readiness indicator. The researchers looked for correlation in factors including "student self-motivation, time management skills, self-discipline, reading rates, reading recall, persistence, availability of time, ability to use technology tools, typing speed, and typing accuracy" (Shaw et al., 2016, pp. 24-25). They discovered learning preferences are primarily verbal and

physical, as well as the personal attribute of procrastination, correlated with a likelihood to withdraw; while having a strong clear reason for completing a degree and higher typing speed, as well as advance technological skill, correlated with persistence (Shaw et al., 2016). Additionally, they reported an outreach program that provided additional support for the online students was successful in increasing the completion rates of the online students by 11% (Shaw et al., 2016). Their research indicates there are predictors of student success in the online environment that may be employed by institutions to determine if online course work is appropriate for a student.

Bernard et al. (2004) performed a meta-analysis of literature, spanning a 17-year period (1985-2002), to look at distance education and determine if the research shows discrepancies in achievement and retention. They also sought to identify whether or not the mode of communication utilized in the course, asynchronous or synchronous, contributed to student retention and achievement. Communication in online courses can take an asynchronous form (email, discussion posts, recorded commentary), where the communication is not being done in real time, or a synchronous form (web conferencing, telephone communication), where the communication is occurring in real time (Cho & Cho, 2014).

The researchers found extremely wide variability in the outcomes for the measures they looked at, essentially indicating, "DE works extremely well sometimes and extremely poorly other times" (Bernard et al., 2004, p. 405). In certain instances, the online students outperformed the traditional students by wide margins, and in other situations, the reverse was true. Interestingly, their research found that DE courses utilizing synchronous communication had higher achievement than traditional courses,

while those using asynchronous communication had lower achievement, and retention was higher in DE courses utilizing synchronous communication (Bernard et al., 2004). The multitude of conflicting data indicates this is a complex issue without a one size fits all solution. However, instructional methods in online courses may be key in engaging and motivating students leading to persistence and success.

At BTC, attrition and success rates have shown to differ in relation to mode of delivery, matching what is reported in the literature. Based on data collected over a series of years beginning in 2014, attrition rates are consistently higher in courses delivered online or in a hybrid format, in comparison to those delivered traditionally. What the college has found, after looking at two years of data, is an eight to nine percent lower attrition rate for students in traditional courses compared to courses delivered fully online and a five to six percent lower attrition rate in traditional courses compared to hybrid sections (Hoppe, 2016). Additionally, it has been shown success rates between traditional and online courses differ approximately ten percent in favor of the traditional delivery mode and three percent when comparing traditional delivery to hybrid courses, again in favor of traditional delivery (Hoppe, 2016). It should be noted these numbers were reported across all disciplines at the college. These discrepancies are what have necessitated the current action research study, and a review of the literature has indicated motivation could be diminished in online students due to their isolation, contributing to higher attrition and lowered success.

Motivation

The following pages discuss the dependent variable of this study, motivation. Motivation is defined as a construct, and a description of different varieties of motivation

is provided. Next, theoretical perspectives on the construct are reviewed, including the historical development of theories relating to motivation, concluding with a discussion of social cognitive theory. Motivation and its correlation with achievement are addressed and motivation in the realm of online education is examined. To conclude the discussion, the measurement instrument utilized in this study, the Motivated Strategies for Learning Questionnaire (MSLQ) is described.

Motivation as a construct. "Motivation is an important quality that pervades all student activities…motivated students display interest in activities, work diligently, feel self-confident, stick with tasks and perform well" (Schunk, Pintrich, & Meece, 2008, p. 3). It is a logical assumption if a student is educationally motivated, they will have higher academic achievement, and the converse holds true, an unmotivated student will perform poorly. Motivation has become a main concern of many educators as a target for academic improvement, evidenced by the growing list of publications related to student motivation (Bolkan, 2015; Deci & Ryan, 2001; Hartnett et al., 2011; Schunk et al., 2008; Weber, 2003). Bolkan (2015) claims, "promoting motivation is so essential that some researchers claim it is one of the most important concepts in education" (p. 80).

It has been shown motivation decreases as a student moves through middle school and into high school. A 2004 survey by the National Research Council reported that over 40% of high school students are "disengaged from learning, are inattentive, exert little effort on school work, and report being bored in school" (Center on Education Policy, 2012, p. 2). Lack of motivation has also been linked to attrition. A 2006 survey sought to identify causes for high school dropouts and found that 70% of students who dropped

out cited lack of motivation as a cause (Center on Education Policy, 2012). It is clear that motivation is linked to student success and persistence in courses.

Motivation is essentially the force that keeps someone interested and engaged to participate in an activity or complete a task. There are a multitude of ways the construct has been defined in the literature, but for the purposes of this dissertation, motivation is defined as "the process whereby goal directed activity is instigated and sustained" (Schunk et al., 2008, p. 4). Motivation as a process promotes student investment in coursework and associated tasks, evidenced by successful completion of those tasks and ultimately the course; if a student is unmotivated, there is no impetus or force driving them to academic success and achievement (Ryan & Deci, 2000).

The population of students seen in BIO 101 hybrid sections at BTC varies widely, ranging from recent high school graduates enrolled in college for the first time to nontraditional students working full time with families. When comparing to traditional face-to face BIO 101 lectures, a larger percentage of students are less engaged, less active in coursework, contributing infrequently and prone to missing deadlines, all indicators that motivation levels in the online courses are lower. It is unknown whether students came into the course less motivated or if the isolation present in online courses is contributing to a lack of motivation.

Motivation can vary in its level and in its orientation, intrinsic or extrinsic. Motivation levels and orientation can ebb and flow throughout the types of typical activities found in the curriculum of a course (Schunk et al., 2008). Intrinsic motivation describes the internal force driving someone to do something because of enjoyment or interest, while extrinsic motivation refers to being driven by a goal outside of one's self

(Ryan & Deci, 2000). An intrinsically motivated person will work on a task for the enjoyment of the task, or for the value seen in the activity, which can include learning new concepts or skills. Someone driven by extrinsic motivation alone values the outcome of the activity more than the activity itself, for example, the grade, reward or praise is what is sought. Schunk et al., (2008) point out the orientation of motivation is "time and context dependent…they characterize people at a given point in time in relation to a particular activity" (p. 237). Therefore, it is expected for motivation to fluctuate in different courses or during different types of activities within a course.

Research has indicated the setting of goals, which gives a student an achievement target, can influence motivation. If a student sets realistic, achievable goals, they are often more motivated for success (Center on Education Policy, 2012). Dweck asserts these goals drive motivation and direct the action an individual will take (2017). Social cognitive theory states, "Learners with a goal and a sense of self-efficacy for attaining it engage in activities they believe will lead to goal attainment" (Schunk et al., 2008, p. 174).

Daniel Pink asserts there are primarily two different kinds of motivators (Azzam & Pink, 2014). One is the "if-then" motivator, which implies if you do this, then you will receive this, which is a performance motivator; you complete a task with a performance goal in mind. The other is what Dweck refers to as learning goal, also known as a task oriented goal or a mastery goal, which is the desire to learn or master a skill or content (2017). When examining the orientation of goals, "task orientation refers to the goal of… improving one's skills…[and] task oriented individuals roughly equate learning with skill, stress the value of effort, and believe that through diligent effort they can improve their

skills" (Schunk, 1995, p. 127). While performance goals may be adequate motivators for short-term, low-skill tasks, mastery or learning goals are more critical with complex subjects and authentic learning (Azzam & Pink, 2014). Regardless of the orientation of the goal, the goal itself is still critical to drive success.

Theoretical perspectives. Very early psychological perspectives on motivation were based in an individual's desire (will) and their act of attaining that desire (volition) (Schunk et al., 2008). Motivational theories had their origins in behavioral learning theory whereby motivation was viewed as a change in the occurrence rate of a particular behavior due to external influences. Behavioral learning theorists view learning as something fully observable based on the behavior of the learner in response to environmental antecedents (cues) and consequences (Driscoll, 2012). Contemporary views on motivation are based in cognitive learning theories that focus on the relationship of cognition to motivation, relating the mental processing to the motivational force (Schunk et al., 2008). Behaviorism has limitations including the social aspect of learning; these limitations opened the door for cognitivists who value the importance of what is occurring unseen in the mind, cognition.

A key cognitive theory, social cognitive theory, has been closely tied to motivational processes. Social cognitive theory, originally developed by Bandura and built on Rotter's social learning theory, recognizes the critical nature of an individual's social environment on their motivation (Bandura, 2001). Rotter's theory asserts an individual's behavior is learned through social interactions and thus is interwoven with our needs for social acceptance; an individual will act a certain way if they perceive a positive outcome for that action, and conversely will not act in ways that produce

negative consequences (Schunk et al., 2008). Dweck (2017) states "the need for positive social engagement is the most basic form of social need, and I call this the *need for acceptance* because it expresses children's early need to participate in supportive relationships" (p. 691). Social interaction and acceptance are a basic human need and a driving motivator of human behavior.

Bandura (2001) explains "people are self-organizing, proactive, self-reflecting, and self-regulating, not just reactive organisms shaped and shepherded by environmental events or inner forces…human self-development, adaptation, and change are embedded in social systems" (p. 266). Bandura uses a framework of triadic reciprocality to explain how human behavior, cognitive factors, and environmental influences all interact in a reciprocal fashion to drive function (Bandura, 2001). Inherent within Bandura's theories on motivation is the influence of self-efficacy, the more a student believes they can achieve something, that they are capable of success, the more likely success will follow (Zimmerman, 2000). "Children may come to believe either that their talents and abilities are largely fixed (a fixed mindset) or that they can be developed (a growth mindset)" (Dweck, 2017, p. 698). Dweck goes on to say these mindsets are predictors of behavior, "such as the selection versus avoidance of challenging tasks, and persistence versus withdrawal in the face of difficulty" (2017, p. 698). According to Zimmerman (2000), students who have a stronger belief in their ability to succeed, will work more diligently and persist longer in a course while also being able to overcome difficulties when compared to students who doubt their potential success.

Key to social cognitive theory is how social comparison can influence motivation and modeling can play a primary role in this process. According to Schunk (1999),

observing others in social interactions, social modeling, provides information about appropriate behavior, and is a motivating force in human behavior. He states, "Social factors influence learners' achievement beliefs and outcomes and when social information is internalized learners employ it self-regulatively to promote achievement" (Schunk, 1999, p. 224). The social interactions we experience are a driving force for whether we are motivated to participate and achieve academically.

According to Hartnett et al., "Contemporary views link motivation to individuals' cognitive and affective processes, such as thoughts, beliefs, and goals, and emphasize the situated, interactive relationship between the learner and the learning environment" (2011, p. 21). There are four widely accepted influences of student motivation: competence (self-efficacy), autonomy (self-control), interest (valuing the material), and relatedness (belonging socially) (Center on Education Policy, 2012). If one of these influences can be affected, it has the potential to increase student motivation, which in turn can lead to greater academic achievement.

Motivation and academic achievement. Bolkan (2015) reports students who are intrinsically motivated have been shown to "persist longer on tasks" and intrinsic motivation "has been associated positively with their self-regulated learning and classroom performance" (p. 81). Bolkan (2015) also asserts intrinsic motivation has been linked "with students' final course grades, critical thinking, and effort" (p. 81). Instructional stimulation has been shown to tap into affective learning, challenging students, leading them to enjoy the course work, and increasing their levels of intrinsic motivation (Bolkan, 2015). Therefore, the method of instruction and its ability to

stimulate the learner can tap into intrinsic motivation leading to beneficial outcomes for students.

Weber (2003) claims, "Internally motivated people use more sophisticated reasoning skills, more learning strategies and show a greater amount of recall and processing of text messages" (p. 377). This reinforces the concept that a student will do better academically if they are motivated; and interestingly enough extrinsic motivation is not the driving motivational process in academia. Ryan and Deci (2000) have shown extrinsic motivators applied in the academic setting (rewards systems for example) can actually serve to lessen a student's natural intrinsic motivation. Lieberman (2014) calls these motivators carrots and sticks, rewards and punishments that were once thought to drive classroom learning. Pink states the carrot and stick approach confuses the two types of goals, performance, and mastery (Azzam & Pink, 2014). Unfortunately, our current educational system stresses the carrot and stick method through grading systems and in turn minimizes mastery.

Many researchers have linked academic achievement with motivation. Gottfried (1985) employed an academic intrinsic motivation inventory (CAIMI) as well as standardized test scores and anxiety inventories to assess the relationship between intrinsic motivation in children and their academic achievement. It was found there was a positive correlation between academic intrinsic motivation and a students' self-efficacy as well as their academic achievement and higher self-efficacy resulted in lower anxiety in students. "Academic intrinsic motivation is positively and significantly related to children's school achievement as measured by both standardized achievement tests and teacher grades" (Gottfried, 1985, p. 638). Dagnew (2017) was able to correlate students'

attitudes towards school, value placed on education, and achievement motivation to academic achievement; students with higher achievement motivation outperformed their counterparts with lower motivation levels (2017).

Addressing the complexity of motivation, Hartnett et al. (2011) looked at learner motivation using the SIMS scale that collects self-reported motivation data in the areas of intrinsic motivation, extrinsic motivation, and amotivation. The researchers found motivation is situational and contextual across groups of students (Hartnett et al., 2011). They also reported there were multiple types of extrinsic motivation at play, along with intrinsic motivation, proving that motivation is complex, and not explained by looking at one aspect of a course or learning environment (Hartnett et al., 2011). This reinforces the concept that human motivation, and therefore student motivation, is complex and fluid in nature.

Motivation in online education. Reports in the literature indicate a link exists between student motivation and student persistence and success in a course (Hartnett et al., 2011; Poellhuber, Chomienne & Karsenti, 2008). It should be noted, based on simple logic, a student who is highly motivated would perform well in any course format. However, significantly higher attrition rates in online courses and the reported link between lack of motivation and attrition (Bolkan, 2016) can indicate motivation could be an influencing factor in the increased attrition and lowered success in the online environment. While online education offers the convenience factor and autonomy for students, to succeed in an online course, it may be even more necessary for those students

to be highly motivated than it is in the traditional classroom setting to achieve academic success.

Genc, Kulusakli, and Aydin (2016) explain, "Intrinsic motivation is found to be a significant predictor of persistence and achievement in distance education" (p. 64). Rovai, Ponton, Wighting, and Baker (2007) sought to determine if there were differences in motivation of online students in comparison to their traditional counterparts. The researchers utilized the Academic Motivation Scale for college students, which asks students why they attend college. They found that students in online courses displayed greater levels of intrinsic motivation in all three intrinsic motivation areas: to know, to accomplish things, and to experience stimulation (Rovai et al., 2007).

Contrary to Rovai et al.'s findings, Genc et al. (2016) found when comparing levels of motivation and attitudes of students learning English as a second language online in comparison to their traditional counterparts, both groups had low to moderate levels of motivation. Xie and Huang (2014) looked at online student's goal orientations as well as their participation and motivation. They sought to determine whether a student with mastery goals, goals of mastering the content or material (intrinsically motivated goals), would be more or less active or motivated than students displaying performance goals, goals set based on the desire to perform well (extrinsically motivated goals) (Xie & Huang, 2014). The researchers found students with mastery goals were more motivated than their counterparts and also were more frequent participants in online asynchronous communication (discussion boards) than their counterparts (Xie & Huang, 2014).

There is a lack of research into online student motivations in comparison to their traditional counterparts. Most published studies look at motivation online without a face-

to-face classroom comparison. Additionally, the confounding variable of different types of students taking online courses versus those in a traditional classroom could contribute to ambiguous or conflicting data. This may indicate other factors like student age, gender, course design, or subject matter may be influencing the level of motivation in a course whether the format is online or traditional.

Measuring motivation, the MSLQ. The Motivated Strategies for Learning Questionnaire (MSLQ) is a survey used for assessing college students' motivational orientations and their use of different learning strategies for a college course (Pintrich et al., 1991). The survey consists of two sections, one assessing learning strategies and the other examining student motivation in a course. The MSLQ is specific to a student in a course, not a student in general; essentially, it looks at measuring a student's motivation within the realm of a course they are taking, not their overall academic motivation. The MSLQ was founded on the social-cognitive theoretical framework and assumes "that students' motivation varies for different courses . . . and that their strategy use might vary as well depending on the nature of the academic tasks" (Duncan & McKeachie, 2005, pp. 117-118). It was chosen as the most appropriate instrument for this study, as this study focuses on motivation within a specific course, not motivation of the student to school or learning in general.

It is a widely utilized resource for faculty members to employ in an effort to make decisions about changes to courses. It has been translated to many languages and utilized by hundreds of researchers, as well as instructors, proving to be a reliable and useful instrument (Duncan & McKeachie, 2005). "Perhaps the most frequent use of the MSLQ is for evaluating the effects of courses on students" (Duncan and McKeachie, 1995, p.

120). The scale has been used to assess changes in motivation and cognition when novel instructional methods are introduced like coaching, verbal praise, course structuring, peer tutoring, cooperative learning, intervention strategies, and educational technology (Duncan & McKeachie, 2005). This study introduced collaboration into the delivery of an online BIO 101 course, and therefore the MSLQ is appropriate to measure changes in motivation due to the introduction of this novel instructional method.

The validity and reliability of the MSLQ has been investigated and documented repeatedly. Table 2.1 lists the coeffiecent alpha (Cronbach's alpha) values associated with the items in the survey measuring motivation. The alpha value is a measure of reliability, most specifically, internal consistency. Essentially, it is a measure of how well the instrument measures what it is designed to measure, in this case, student motivation. Higher levels of reliability will demonstrate the test consistently measures the construct it was designed to measure, and the items within the survey all measure the same underlying concept. The coefficient alpha will vary from zero to one, with numbers closer to one indicating items within that scale measure the same underlying concept (Goforth, 2015). Pintrich et al. (1993) state, "The coefficient alphas for the motivational scales are robust, demonstrating good internal consistency" (p. 808). The alpha levels of the items assessing motivation in the MSLQ are excellent for determining task value and self-efficacy for learning and performance. The scale is least reliable when measuring extrinsic goal orientation and control of learning beliefs but still, certainly, falls within an acceptable range (Pintrich et al., 1993), and as such was an effective tool for measuring motivation in this application.

Table 2.1 Coeffeicient Alphas of the MSLQ Scale Items Measuring Student Motivation

Motivation Scales	*Items Comprising the Scales*	*α*
Intrinsic Goal Orientation	1, 16, 22, 24	.74
Extrinsic Goal Orientation	7, 11, 13, 30	.62
Task Value	4, 10, 17, 23, 26, 27	.90
Control of Learning Beliefs	2, 9, 18, 25	.68
Self-Efficacy for Learning and Performance	5, 6, 12, 15, 20, 21, 29, 31	.93
Test Anxiety	3, 8, 14, 19, 28	.80

Note. Data from: A Manual for the Use of the Motivated Strategies for Learning Questionnaire (MSLQ) by Pintrich et al. (1991).

Collaboration

This section of the literature review addresses the independent variable of this study, collaboration in online course work. It begins with a discussion of the theory of social constructivism, including its foundation and implications, which is followed by an examination of the importance of the learning community to learners. Next, collaboration as a tool to foster social interaction is discussed in its relation to learner motivation. Additionally, student perceptions of collaboration in courses are reviewed including a consideration of common issues associated with collaboration in online coursework.

Social constructivism. Historically, in education there has been a significant amount of attention paid to the social aspect of learning through the work of researchers like Baldwin in the late 1800s, Piaget in the early 1900s, and Vygotsky in the 1970s (Blatchford, Kutnick, Baines, & Galton, 2003). When examining learning theories, constructivist theories are aligned to understanding how a learner creates their own

knowledge constructs, and the significance of what their method of creation tells us about the thought processes of the learner (Adams, 2006). The learner is constructing meaning from their interactions and experiences. The term social constructivism has its origins with John Dewey in 1963 where Dewey claims education is truly the result of "the empowerment of the learner in a social situation" (St. Pierre, 1996, p. 91). The social constructivist view of learning is based in the concept that learning does not occur as an isolated phenomenon; humans are social creatures, and the interaction socially amongst us is how effective learning comes to exist (McKinley, 2015). Lieberman (2014) asserts, "We are built to learn together, to share what we know" (p. B5). The social aspect of the human condition is interwoven with learning and may just be the most critical component of the learning process.

Vygotsky was labeled the "pioneer of social constructivism" based on his theory of social learning (Liu & Chen, 2010, p. 64). Vygotsky (1980) argued social interaction was the filter for all cognitive function; therefore, the segregation of the social context from the learning was an impossibility. Additionally, his theory was learning occurred in a stepwise fashion, initially as a result of interaction amongst individuals (deemed inter-psychological) and then becoming internalized within the individual self (intra-psychological) (Adams, 2006).

A significant contribution of Vygotsky's to the theory of social constructivism was his concept of the zone of proximal development. The ZPD, as it is often referred to, is essentially the difference in an individual's ability to learn and therefore develop independently through problem solving as a solo activity and their potential to learn when interacting socially, through either peer collaboration or expert guidance (Gunawardena

et al., 2009). Vygotsky believed that the ZPD was important because any learning not reaching for a new developmental stage, situated at a level an individual has already reached, is ineffective (Vygotsky, 1980). Therefore, effective learning is learning striving for new development.

The concept of learners being influenced by their social interactions, and their interactions with the environment around them, can also been seen in Dewey's claims the human experience does not occur in a vacuum and social interaction outside of an individual is the foundation of the human cultural experience (Liu & Chen, 2010). Garrison (1995) posits the "epistemology of Deweyan Pragmatism can serve social constructivism" (p. 717). An important factor of the human experience highlighted with Vygotsky and Dewey's theories is the importance of language to the human social experience (Garrison, 1995). Language separates humans from other animals and is a central characteristic of our culture; language is key to social interaction, and therefore dialogue is key to social constructivism. "The role of language in a constructivist environment is that of the mediator between the learner and the world, shaping and extending thought" (St. Pierre, 1996, p. 91).

When examining the role of the teacher in a classroom employing methods that have a social constructivist orientation, the teacher is the facilitator (Adams, 2016). The teacher serves to design opportunities to provide learners with "incentives to construct knowledge and understanding" (Adams, 2016, p. 250). This should not be viewed as a removal of the teacher; it simply is a shift in the orientation of the classroom; the teacher facilitates knowledge construction anchored in the social interaction of the learners (Adams, 2016). Employing techniques like collaborative projects reinserts the social

interaction element into a course, which in the online format, may have no social element, or limited interaction through asynchronous dialogue on discussion boards (Dixson, 2015).

The importance of community. A classroom community is a group of individuals that interact and learn together, fostering relationships that support a feeling of interconnectedness and belonging (Gunawardena et al., 2009). Rovai (2001) defines community as a "feeling that members have of belonging, a feeling that members matter to one another and to the group" (p. 34). **"**In a learning community grounded in constructivism, learners mediate knowledge within a social context" (St. Pierre, 1996, p. 91). Online learners have reported a lack of the feeling of interconnectedness with faculty as well as with other students in their online courses, which they report to have negative impacts on their experiences in the course (Koh & Hill, 2009). While online learning offers autonomy, there is also a tendency for isolation to creep into the online classroom. It is important for curriculum in online learning to incorporate techniques facilitating the development of a community amongst the learners (Rovai, 2001).

The interactions we have as social beings involve sharing our own existing knowledge, and exposure to new knowledge from others. McKinley (2015) indicates, "Interactions of sharing ideas are what establish a learning community where students come to understand the basis for their social and cultural identities" (p. 198). Therefore, if learning activities social in nature are interwoven into the curriculum, there is a greater opportunity for learning. This would reasonably lend itself to the application of collaborative activities requiring social interaction amongst learners.

Rovai (2001) stresses when there is a strong sense of community in the classroom, knowledge flow and cooperation increase, a support network is fostered, and there is a general group commitment to a common shared vision. Rovai (2001) goes on to explain, "Learners benefit from community membership by experiencing a greater sense of well-being and having a larger set of willing individuals to call on for support" (p. 33). Adams (2006) says effective learning can only occur if course elements are provided for students to engage in social interaction, which fosters the construction of knowledge through the social experience. The social interaction fostered through the introduction of collaborative activities has the potential to attenuate the lack of community and isolation felt in the online class environment.

Collaboration in online education. In the online education realm, the potential benefits of collaboration through group work are exciting. Online courses provide a venue for creating social interaction; building a learning environment benefited by interaction amongst students (Brindley, Blaschke, & Walti, 2009; Kleinsasser & Hong, 2016). Online collaboration can involve group work which is students working together to execute a task in a collaborative manner through electronic forms of communication regardless of temporal or geographical isolation (Koh & Hill, 2009). Working with other learners in a collaborative fashion provides the opportunity to share information and resources, construct knowledge together and learn more deeply, also mimicking what they will be required to do in many professional practices (Cho & Cho, 2014; Kleinsasser & Hong, 2016). The results of studies assessing the impacts of collaboration in online courses are discussed in the paragraphs that follow.

Bernard et al. (2009) performed a meta-analysis of the literature assessing the effects of different types of interaction, student-student, student-teacher, or student-content, on students completing courses at a distance. The authors explain research in online course work is often "univocal about the importance of interaction" (p. 1246) and the potential benefits include "social presence and satisfaction" (p. 1247) (Bernard et al., 2009). They found there was a significant impact on student learning when course work was designed to promote interaction; this impact was evidenced by achievement. Additionally, it should be noted, that the impact of student-student interaction was greater than that of student-teacher interaction (Bernard et al., 2009).

In a follow up paper in 2011, many of the same authors reconvened to discuss the implications of new directions of distance learning, designed with interaction as the central focus (Abrami et al., 2011). The positive impact of interaction was stressed; "purposeful, interactive distance education, should be better designed to facilitate interactions that are more targeted, intentional and engaging" (Abrami et al., 2011, p. 87). The authors posit it is key students take responsibility for their own learning, have a role in assisting the other learners they are working with, and are encouraging to help the group reach their goals (Abrami et al., 2011). The authors define four key principles that should be employed in designing course work promoting collaboration in the online realm: promotive interactions amongst learners, accountability of the individual learner, giving and receiving thorough explanations, and positive interdependence (Abrami et al., 2011).

Donaldson and Bucy implemented a collaborative project involving the co-authorship of a book using Google Docs in an online course to determine the impact of

constructionist principles, including cognitive and social constructivism, on engagement and motivation (2016). If intrinsic motivation is high, quality, creative learning can be the potential result, however the learner needs autonomy, the feeling of competence (self-efficacy), and learner agency (the freedom to act) (Ryan & Deci, 2000). Donaldson and Bucy (2016) reasoned collaboratively authoring a book could affect intrinsic motivation by influencing student autonomy and agency. Through student feedback on the project, it was shown that deep engagement and elevated intrinsic motivation were promoted in the course, as was anticipated (Donaldson & Bucy, 2016). Student responses indicated that the social system of the group working toward a common goal created an interdependent community of learners. The students were motivated by knowing other group members were counting on them; the collaborative aspect increased the commitment and the motivation to perform well resulting in "mutual benefit and high persistence" (Donaldson & Bucy, 2016, p. 134). Additionally, the public nature of the projected to be published book ensured an authentic audience, again motivating students to participate and achieve (Donaldson & Bucy, 2016).

Leow and Neo (2016) reviewed student perception as well as student-student interaction in a course employing constructivist collaborative instructional design; particular attention was paid to student motivation and affective factors. The authors posit tools employed to promote interaction and collaboration as well as social support are part of the foundation of a constructivist learning environment; providing the opportunity for effective learning (Leow & Neo, 2016). After reviewing student feedback from interviews and questionnaires over a three-year period the researchers found student motivation was closely tied to student's feelings of competence, the value

they place on course tasks and content and their ability to relate and feel as if they belong to a learning community (Leow & Neo, 2016). If the practice of collaboration involving social interaction is employed through creative course design, student motivation can be stimulated (Leow & Neo, 2016).

Poellhuber, Chomienne and Karsenti (2008) sought to determine what instructional strategies or intervention methods have an influence on student's motivation and persistence in online courses. The researchers wanted to assess whether peer collaboration or collaborative learning would lead to an increase in student self-efficacy leading to an increase in persistence rates (Poellhuber et al., 2008). The authors stated, "Communication in distance education should aim to alleviate the sense of isolation experienced by distance learners and sustain their motivation" (Poellhuber et al., 2008, p. 44). The MSLQ was utilized in conjunction with questionnaires and interviews to determine if students in an online course with added collaborative activities showed a change from students in the course without collaboration (Poellhuber et al., 2008). Persistence was shown to be greater in the groups with no collaboration, however, interviews and questionnaires led to the identification of significant differences between the groups, which influenced these results rather than the conditions (Poellhuber et al., 2008).

They reported a lower than average registration for the course involving peer collaboration indicating students may not prefer this method instructional technique (Poellhuber et al., 2008). The authors reviewed the implementation strategies utilized; demonstrating problems with implementation and low numbers of students in treatment conditions had an impact on the data. However, it is interesting to note, when students

participated in collaboration they viewed it positively and related the positive affects it had on questionnaires and in interviews; indicating while distance learning students may not like the idea of collaborating, it has the potential to have a positive impact (Poellhuber et al., 2008). I have seen the aversion to collaborative exercises first hand in traditional classes where students are concerned about work distribution and the possibility of a grade being impacted by peer contributions. Careful implementation of collaboration is key to minimize these concerns in the online sections. A component of this study is assessing student perceptions of collaborative activities at the conclusion of the intervention to determine their views of collaboration in terms of its appeal and effectiveness. Research clearly indicates collaboration can be beneficial; however, it seems student perceptions of collaboration online may not be positive.

Student perceptions and challenges in online collaboration. Students who attempt courses in the online format are most often seeking a flexible school schedule, which can negatively influence their view of required collaboration with classmates (Brindley et al., 2009). The benefits of student collaboration are clear; however, student perceptions of required collaboration are often mixed. Group work is often perceived as more challenging in the online environment than in traditional face-to-face courses (Koh & Hill, 2009). The same conditions that make online coursework convenient, asynchronous communication and self-paced instruction can make group work more difficult online.

Evidence from student feedback shows students often feel collaboration limits their autonomy, and can provide the opportunity for unequal participation and miscommunication (Cho & Cho, 2014; Kleinsasser & Hong, 2016). The free-rider effect,

unequal distribution of the workload where one student does little to no work, thereby decreasing the success of the group, is what students most fear in relation to group work in a course (Roberts & McInnerney, 2007). It is recommended for instructors in online courses grade not only the quantity, but also the quality of participation, which can limit this problem (Cho & Cho, 2014). If assessment criteria are clear and creative methods, such as group members evaluating the contributions of their peers to the overall group effort, are employed, loafing can be minimized (Roberts & McInnerney, 2007). In an attempt to minimize the free-rider effect, peer evaluation was included as a component of the grade for collaboratively constructed discussion posts in this study.

In their review of the most commonly, cited problems associated with group work, Roberts and McInnerney (2007), assert the number one issue is the antipathy of students to being required to work with their classmates, which can be addressed by explaining the potential benefits. When working as a group, students often do not have the appropriate skill set to successfully interact and be productive as a team (Roberts & McInnerney, 2007). Students tend to focus on completing tasks by due dates rather than on meaningful interaction with their group members (Kleinsasser & Hong, 2016). It is therefore important, prior to the implementation of a collaborative activity, to cover skills like netiquette, effective communication, and responsible group behavior (Roberts & McInnerney, 2007).

Students with past online experience tend to view collaboration more positively, which may be due to their knowledge of how to interact within a group successfully (Cho & Cho, 2014). I introduced the collaborative activities during one of the on-site lab sessions students are required to attend. This provided me with the opportunity to stress

proper communication strategies and the importance of quality contribution from all group members.

In online collaborative activities, there is the opportunity to employ asynchronous communication rather than synchronous communication in real time. Asynchronous communication can allow time to think about and construct replies, with less interference to a desired flexible school schedule (Cho & Cho, 2014; Kleinsasser & Hong, 2016). The potential of allowing students time to employ critical thinking and reflection prior to responding to their peers or their instructor can produce more "thoughtful and in-depth comments from their classmates than what might occur in a synchronous context (Koh & Hill, 2009, p. 71). For this study, I suspected requiring synchronous communication would lead to more antipathy towards collaboration and would negate the benefits of reflection and critical thinking found with asynchronous communication. Therefore, groups worked through asynchronous communication unless they chose to arrange synchronous communication themselves.

Focusing the Study

I currently see higher withdrawal rates and lower academic achievement in the online BIO 101 lecture course that I teach. The results of this literature review have indicated what is often lacking in online coursework is meaningful social connection amongst learners. In an online class, learners are more isolated, moving through difficult coursework with a tenuous connection, at best, to their classmates. Social connection is key to the construction of knowledge and feeling a sense of belonging to the class as well as the material (Leow & Neo, 2016; Bernard et al., 2009). Employing collaborative instructional methods will foster this social interaction.

The literature indicates motivation and social connection are linked (Poellhuber et al., 2008; Donaldson & Bucy, 2016; Abrami et al., 2011). If I promote meaningful social interaction and connection amongst my online students, I can potentially influence student motivation. The literature shows motivated students are more likely to persist and achieve academic success (Bolkan, 2015; Deci et al., 2001; Radovan, 2011; Ryan & Deci, 2000; Weber, 2003). These connections were used to design this action research study.

Conclusion

This action research study investigated the implementation of an instructional methodology involving online collaboration in an effort to bolster online student motivation in a hybrid Biological Sciences I college course. This study was necessitated by the increasing desire of students to take courses in the online format (Allen & Seaman, 2013) particularly in the community college setting which is the setting for this study. This explosion in students taking higher education courses online has been paired with reports of increased attrition as well as reduced academic achievement rates for online students (Fonolahi et al., 2014; Garman and Good, 2012; Hachey et al., 2013; Jaggars et al., 2014; Schroeder et al., 2016). The discrepancies in success and attrition in traditional courses in comparison to online courses may be due to learner isolation in online environments, which may lessen student motivation. Instructional methods, like collaborative activities, can attenuate learner isolation and have the potential to elevate student motivation.

Research has repeatedly shown when students are more motivated, they are more moved to participate in class activities, invest time in course work, and are more likely to

succeed and persist in the course and in their academic career as a whole (Bolkan, 2015; Deci et al., 2001; Radovan, 2011; Ryan & Deci, 2000; Weber, 2003). Goal setting, as well as a student's self-efficacy, has been shown to be linked to motivation levels in students (Bandura, 2001; Dweck, 2017; Schunk et al., 2008; Zimmerman, 2000). Additionally, students with elevated intrinsic motivation have been shown to perform better and demonstrate greater persistence (Azzam & Pink, 2014; Bolkan, 2015; Genc et al., 2016).

This study employed the MSLQ as a measurement of motivation in conjunction with the introduction of a social constructivist instructional methodology, collaboration in an online class to synthesize group discussion posts, to increase student motivation. Meaningful online interaction, through collaboration amongst learners, introduces the social element of human interaction, deepening the potential for opportunities to construct knowledge together, learn from each other, and develops better social skills (Adams, 2006; Cho & Cho, 2014; Kleinsasser & Hong, 2016; McKinley, 2015; Rovai, 2001). Targeted collaboration has the potential to enhance the learning environment by fostering a sense of community amongst learners, who have the potential to be isolated in an online course (McKinley, 2015; Rovai, 2001). Online interaction in a course can be asynchronous, providing the opportunity for more in-depth reflection and more thoughtful communication among learners than is typical in a traditional face-to-face setting (Cho & Cho, 2014; Kleinsasser & Hong, 2016). It has been shown that meaningful collaboration can also influence motivation, persistence, and academic achievement in courses (Donaldson & Bucy, 2016; Leow & Neo, 2016; Poellhuber et al., 2008).

The desired outcome of this action research study was to identify instructional methodologies that can be employed in higher education courses delivered in the online format to improve academic achievement and retention rates. Achievement and attrition have been shown to be reduced in all online courses, but the gap is widest in STEM courses (Garman & Good, 2012; Hachey et al., 2013). As the demand for online course offerings increases, it is important to research and identify creative techniques with the potential to provide opportunities for online students to be as successful as their peers taking courses in the face-to-face format are.

CHAPTER THREE

METHODOLOGY

As previously stated, action research is a process of inquiry performed by individuals in many fields of study and practice, including education, in an effort to address an identified problem of practice, and performed onsite of that identified problem. "More important, action research is characterized as research that is done by teachers for themselves" (Mertler, 2014, p. 4). Action research is an iterative process that spirals from one action research cycle to the next. According to Dana and Yendol-Hoppey (2014), these spirals are essentially cycles that include the following series of steps:

> (1) Clarifying and diagnosing a practical situation that needs to be improved or a practical problem that needs to be resolved; (2) Formulating action strategies to improve the situation or resolve the problem; (3) Implementing the action strategies and evaluating their effectiveness; and (4) Clarifying the situation, resulting in new definitions of problems or areas for improvement, and so on to the next spiral of reflection and action. (p. 8)

The desired outcome of action research for a teacher is to solve a specific problem in their own classroom or school in an effort to improve their practice and educational outcomes for their learners. The research is focused specifically on a certain environment, context, or group of students, and results are applicable immediately. This research is an action research study conducted by me, the teacher-researcher, in an effort

to diagnose an identified problem of practice at my institution, within my online classes. The results of this study will be utilized to modify and improve instructional methods I employ in the online biology courses I teach.

Focus of the study

The problem of practice (PoP) of this study was a discrepancy in success rates and withdrawal rates in online and hybrid courses offered at BTC in comparison to their traditional counterparts (see Table 1.1 and Table 1.2). By reviewing data provided by the Distance Learning Institute (DLi) at the College, it was shown that students taking an online or a hybrid (partially online) version of a course are more likely to withdraw from the class than students in the traditional sections are. There is also a discrepancy, albeit an inconsistent one, in comparison of student success rates from course to course data.

In conjunction with the discovery of these discrepancies, the college has steadily increased the number of online courses to meet student demand. This is not just a trend at BTC, national data has shown an increase from less than 10 percent of students being enrolled in at least one online course in 2002 to 32 percent a decade later in 2012 (Allen & Seaman, 2013). The reality of our current state of higher education is not whether or not online courses will persist and grow in numbers; it is how quickly that growth will occur. As educators, there is a need to address gaps in persistence and success like those seen at BTC in an effort to provide well-designed courses that offer opportunities for students in an online class to be as successful as they would be if they were taking the course face-to-face.

The purpose of this study was to examine whether one specific instructional methodology (collaborative activities) introduced in the online lecture portion of a hybrid

Biological Sciences I course (BIO 101) would increase student's motivation to learn and succeed in the course as measured by the MSLQ. Currently, students participate in discussions within this course using individually crafted discussion board posts in response to a question prompt and those posts are submitted to a discussion forum on Desire2Learn (D2L), the class learning management system (LMS).

Introducing collaborative activities into the online course environment can provide a multitude of benefits including the development of a sense of community, building social presence and peer support, learning from other individual's knowledge and exposure to alternative viewpoints (Almajed et al., 2016). Utilizing collaborative learning activities in online courses has been linked to increased student motivation, participation, and achievement (Donaldson & Bucy, 2016; Leow & Neo, 2016; Kerr, 2010).

In addition, as Ally (2004) points out, "Working with other learners gives learners real-life experience of working in a group, and allows them to use their meta-cognitive skills" (p. 31). Individual metacognitive skills involve assessing one's own learning to identify the most effective means of learning and are highly beneficial skills. In a group setting, social metacognition can occur, which "aids group members' identification of errors, construction of shared knowledge, and maintenance of group members' motivations" and can lessen the impact of poor metacognitive skills of individual group members (Chiu & Kuo, 2010, p. 321). The long-term goal of looking at instructional methodologies to increase student motivation was to limit student withdrawal rates and raise success rates in hybrid and online courses at BTC, so they more closely match their traditional counterparts.

I suspected if teachers of online and hybrid science course sections can increase student motivation through creative instructional methods, there would be a positive influence on withdrawal rates and student achievement, resulting in increased student success. The proposed research question was, to what extent would the introduction of collaboratively constructed discussion board posts in a hybrid Biological Sciences at a Technical College affect student-participant motivation? Sub-question A stated, if student motivation is influenced, what type of motivation, extrinsic or intrinsic, is affected? Student perceptions were assessed with sub-question B: What are student-participant perceptions of collaboration in an online class after completion of the collaborative activity?

Action Research Methodology

The action research study followed a quantitative research methodology to answer the question of what impact introduction of collaboratively constructed discussion board posts had on student-participant motivation as measured by the MSLQ. Mertler (2014) states, "anything that can be quantified can be considered quantitative data" which can include "attitudes, interests, or perceptions on some sort of numerical scale" (p. 137). Surveys, questionnaires, and checklists are common techniques to collect quantitative data (Mertler, 2014).

Quantitative data was collected through the MSLQ assessment of motivation (Appendix D), given to students before and after completing the collaborative activities. Student participation was voluntary. Students were informed of the research study's goals and potential impacts for future students, and advised that participation would not affect participant's course grades. All student survey results were coded with

randomized numbers, so no student names were revealed. Levels of motivation, as well as the orientation of that motivation (intrinsic or extrinsic), were examined. Anonymized student scores on independent and collaboratively constructed discussion board posts were also collected. The grades on the posts were used to assess whether the introduction of the collaborative activity had an impact on student achievement through higher scores on posts. Grades were recorded as a change in grade from individual posts to collaborative posts. Rubrics (Appendix G) were utilized for both the individual and the collaborative posts to control grading methods carefully, and these rubrics were provided to the students to ensure they were aware of the grading criteria.

Additionally, qualitative & quantitative data were collected through a Student Perception Questionnaire (Appendix F) administered to assess student-participant perceptions of collaboration in an online class after completing the collaborative activity. The questionnaire included numerical responses, but also employed open-ended questions to allow students to articulate their perceptions more clearly and thoroughly.

Action research design. The independent variable being assessed in this study was student collaboration to complete a graded activity in an online science course. The dependent variable was student motivation. Orientation of motivation, achievement in the form of grades on individual and collaborative posts, and student-participant perceptions of collaborative activities were all assessed as well through data collected. The hypothesis of the study was introduction of collaboration in the online lecture portion of the class will lead to an increase in student motivation, but it was unclear what type of orientation (extrinsic or intrinsic) would be impacted. It was also unknown how achievement would be affected or what student-participant perceptions of collaboration

would be. Current research points to an advantage to having students interact socially through group activities and I anticipated this advantage could be seen in levels of motivation.

This was a one-group pretest-posttest design, also known as a counterbalanced design. While a one-group pretest-posttest design is an improvement over a one shot case study, there is still no control group for comparison purposes (Mertler, 2014). A control group was not utilized due to a small number of course sections which are capped at twenty-two students each and the requirement for all students within the course to complete the same activities for credit. Student-participants could not be assigned randomly to groups for comparison purposes, classifying this as a quasi-experimental study. This was due to intact classes of students who signed up to take BIO 101 in a hybrid format being utilized. Due to the limited enrollment in the course, typically only two or three sections run of this particular course in the hybrid format. Two intact sections were used to increase the sample size of student-participants to a maximum of forty-four.

Ethics and confidentiality. At the start of the semester, students were informed of the research study, and the plan for implementation in class, through a visit to their lab session. I attended all hybrid lab sessions the second week of the semester. As this course is a hybrid course, the students are required to attend lab in a face-to-face setting. I described the voluntary study and its potential to improve the course for future students and I delivered informed consent forms to all of the student-participants. This visit provided a forum to answer any questions about the study the students had, and to collect

signed consent forms simultaneously. I felt it would garner larger potential participation if I met the students face-to-face to describe the study.

As discussed in chapter one, the standards of ethical conduct were upheld throughout this action research study and the principle of accurate disclosure is key to these standards (Mertler, 2014). The informed consent form described the research study and detailed what students would be asked to do during the study. The form advised students that all data collected would be anonymous to ensure confidentiality, and it ensured students that their participation was voluntary. If they chose not to participate in the study, their grades in the course would not be affected in any way. The informed consent form is shown in Appendix A.

Occasionally, students in courses at BTC are under the age of 18 and are therefore considered minors. We enroll some students through the PACE (Program for Accelerated College Enrolment) program who concurrently take high school and college courses. We also have the Early College High School campus on one of our three college campuses, which enrolls high school students in both high school and college courses. Minor student-participants require permission to be obtained through two forms, a parental consent form and an assent form (Mertler, 2014). The parental consent form provided the same information provided to adult students about the nature of the study, participation, and confidentiality through the informed consent form. It was sent home for parent signature with any minor students. Minor students were still required to agree to participate through an assent form. The parental consent form and assent form are shown in Appendices B and C.

Confidentiality or anonymity was maintained in all data collected from student-participants. The student-participants were assigned a random number at the outset of the semester using Microsoft Excel's random number function and all associated grades collected for the study as well as motivation survey results were documented only referencing their assigned number. I graded individual and collaborative discussion board posts utilizing the rubrics provided for the students (Appendix G) and posted student's individual grades in the course learning management system, D2L, gradebook as I would for any assignment. All grading was completed for the discussion posts prior to the analysis of MSLQ and perception questionnaire results. After MSLQ and perception questionnaires were complete, grades were exported from D2L as averages for use in the study. The data collected from the questionnaire used to assess perceptions of collaborative activities in online courses was fully anonymous.

Plan for data collection. As discussed in chapter one, the research site for the proposed action research study was a two-year technical college, BTC, in northeastern South Carolina. The college typically enrolls approximately 8,000 college credit students and the population is predominately white. Despite the more than 80 degrees and certificates offered, most students at BTC are seeking a general education degree in the form of an Associate of Science or Associate of Arts degree to lead them into their chosen path. That path often takes the form of transfer to a neighboring university or admission to one of the technical programs at the college like nursing. Most students at

BTC are part-time students and the population of students taking courses online has grown significantly in recent years.

The course used to conduct the action research study was a four credit hour course, Biological Sciences I, BIO 101; the first in a two-semester sequence of major's biology, fulfilling requirements in the mathematics and natural science category for all Associate of Science students. In a typical fall or spring semester, ten to twelve sections of BIO 101 will run in the traditional format, while two to three sections will run as a hybrid format, a blended format where the lecture is online and the lab meets face-to-face weekly. These hybrid sections have a maximum enrollment of 22 students. Data collected at BTC (shown in Table 1.1 and Table 1.2) indicate the success rate in these hybrid sections is up to 12% lower than in the traditional sections. The withdrawal rate is significantly higher in hybrid and online sections than it is in the traditional sections, a trend that continues. The hybrid sections were used for this study, as the course is not offered in a fully online format at this time.

The online lecture component of BIO 101 accounts for 75% of the students' overall grade in the course, or three of the four credit hours. Of that 75%, 45% is composed of proctored exam grades, 10% is a cumulative final exam grade, 12.5% is homework and exam review quizzes completed through a 3rd party publisher program (Connect from McGraw Hill Education), and the last 7.5% is graded discussion board posts. The collaborative activity was implemented in the discussion post portion of the course.

In past semesters, students composed replies to unit discussion board prompts individually and were required to respond to a minimum of two fellow classmate's posts.

This procedure was followed for all 15 weeks of any semester. For the spring 2019 semester, when the research study was conducted, at the start of the semester, student-participants completed the first three weekly discussion boards exactly as they had in prior semesters, individually. The requirements for the post were clearly stated on the discussion board for students to adhere to, and individual discussion board posts were graded using a rubric published on D2L for students to view. Correct information, thoroughness, grammar, punctuation, and replies to classmates all contribute to the score. The individual discussion post rubric can be seen in Appendix G.

Students were then given the modified MSLQ to assess their level of motivation at the start of the third weekly lab session. When the students began unit three in week four, they were assigned to small groups of three students per group. They then worked collaboratively to synthesize a single group discussion post for week four and week five. After the conclusion of week five, grades were again documented for weeks four and five and the MSLQ was readministered in the subsequent lab session to determine if there was a change in student motivation levels or orientation through the introduction of collaborative work.

There can be pitfalls associated with group work, one of which is a student within a group not putting in their fair share of work. Roberts and McInnerney (2007) assert that:

> The free-rider effect is probably the most commonly cited disadvantage of group work; that is, when one or more students in the group does little or no work . . . contributing almost nothing to . . . and consequently decreases the group's ability to perform to their potential. (p. 261)

This can contribute to student reluctance to participate in projects requiring collaboration amongst students on a graded assignment. To address this potential for free-riders, a rubric was used to grade the collaborative discussion submissions including a percentage of the grade based on student's within the group grading their fellow group members' effort and participation. This was done with a peer evaluation grading form, shown in Appendix H, which students submitted through dropbox (a file submission component of D2L).

Individual discussion posts for the course were created using the D2L Discussion tool. The collaborative discussion posts were created using the free Google Docs application located within the Google suite of applications. Google Docs "can transform any assignment into an interactive and collaborative eLearning experience . . . learners can leave real time feedback, communicate with others in the group, and share their insights and opinions via the document or file application" (Pappas, 2014, para. 3).

Students were given a prompt just as they had been given on the individual posts, but they then used their college email accounts to access a Google Doc page I created for their group to work on. The D2L Discussion tool was utilized to provide instructions, the prompt, and links to the Google Doc pages. Students accessed their Google Docs and created their responses through collaboration with their group members. Using this particular application allowed me to see the revisions history and discover what was contributed by each group member to evaluate participation. Google Docs are accessible through mobile devices; therefore, students could easily access their Google Doc from any device.

Once students completed their collaborative post, they were asked to post a message indicating it was complete to the D2L discussion board notifying all classmates that their post was ready for viewing. After the deadline for completion of the collaboratively constructed Google Docs, students were able to access other group's submissions and post comments through the D2L Discussion tool just as they posted comments to the individual posts.

The discussion prompts created for each unit related to the material covered in the chapters of the unit. Prompts were crafted in an effort to promote the inclusion of critical thinking, current research in biology, and creativity. The prompts were provided to the students through the Discussion Board tool on D2L. The discussion boards were date restricted to match the particular week's availability. Student discussion submissions were linked to the grade book and the rubric to allow for efficient grading and feedback to the students. Screenshots of the individual and collaborative post instructions as well as example prompts used in this study are shown in Appendix H.

At the conclusion of the study, after the posttest MSLQ was administered, and grades were collected and recorded, students were given a questionnaire to assess their perceptions of online collaborative work were. These questions were composed to determine if they had a positive or negative perception of the act of collaborating with classmates on graded work in online classes. Additionally, students were asked whether they felt their performance benefited from the collaboration and whether or not they would like to participate in collaborative activities in other online courses. The questionnaire also included open-ended questions that allowed students to express what they felt the advantages and disadvantages of working with classmates were. Students

were given the opportunity to suggest any improvements to collaborative activities for future sections of the course. The Student Perception Questionnaire can be seen in Appendix F.

The MSLQ

The MSLQ utilizes a Likert-type response scale from 1 to 7, with 1 meaning *not at all true of me* to 7 indicating *very true of me*. The motivation section includes subscales to assess the following: intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance, and test anxiety. A student's score is calculated by summing the student's Likert-type scale responses for each subscale, taking care to reverse any scores for items that are negatively worded, and then taking the average (mean) of the responses, so the overall score is a positive measure of motivation or interest (Duncan & McKeachie, 2005).

The 31 MSLQ motivation questions are shown in Appendix D. The reliability of the MSLQ was discussed in chapter two and coefficient alpha values were presented for the six subscales in Table 2.1. Utilizing only the motivation section of the MSLQ is not problematic, as the instrument was designed to be used together or singly (Pintrich et al., 1991). The instrument is intended to be given in class; therefore, I administered the MSLQ during the course's required weekly lab session, with cooperation of their lab professor, instead of through the course's learning management system, D2L.

Plan for Data Analysis and Reflection

Data collected from the MSLQ was in the form of scores of student responses for the six motivation subscales: intrinsic goal orientation, extrinsic goal orientation, task value, and control of learning beliefs, self-efficacy for learning and performance, and test

anxiety. Each student had an average score for all six subscales as well. Following the MLSQ Manual's instructions for data analysis, the mean for every item was determined, and then the mean for all items within each subscale were calculated (Pintrich et al., 1991). The standard deviation was also assessed as a measure of dispersion to account for any outliers in the collected survey data. The standard deviation "is formally defined as the average distance of scores away from the mean" (Mertler, 2014, p. 171).

A two-tailed paired *t* test was then used to compare the average scores on the first survey with the average of scores on the second survey to determine if any difference seen was significant. Mertler (2014) refers to the repeated-measures *t* test as the appropriate inferential statistic if a pretest-posttest methodology is used on a single group of students. Analysis of the data collected from the two subscales determining the orientation of the motivation, intrinsic goal orientation and extrinsic goal orientation was conducted. I was looking for whether any change seen was due to a change in intrinsic motivation or extrinsic motivation.

The α-level was set at the traditional .05 allowing for a maximum of 5% chance of a type I error resulting in the null hypothesis being rejected when it should have been accepted. Essentially, there was a 5% chance of inferring collaboration did have an impact on student motivation when it actually did not. If the *p*-value determined through the *t* test was less than the α-level, the difference would be deemed statistically significant and the alternative hypothesis accepted. If the *p*-value was greater than the α-level, then the null hypothesis, indicating the introduction of this collaborative activity to the online lecture had no impact on the student's motivation, was accepted. This is a

standard value seen when the MSLQ is employed and descriptive statistics are calculated (Pintrich et al., 1991).

Student Questionnaires assessing their perceptions of collaborative activities were also analyzed. The items on the questionnaire containing scaled answers were summed and the median for the class was determined to draw a conclusion on what perceptions were of collaborative activities in online classes. Because a Likert-type scale was used, the median instead of the mean was determined as a measure of central tendency for the class averages. Mertler (2014) indicates the median, the score that separates all of the scores into two halves, is a better measure of central tendency on Likert-type scales as an average number does not hit a specific value on the scale and is therefore worthless**.** Open-ended answers were collected and reviewed as well for qualitative data.

Grades students received on the independently created discussion posts were recorded and saved to compare to grades received on the collaboratively constructed posts. All items were graded at the end of each week, prior to the process of data collection and analysis for this research study. Scores were evaluated for a change from the independent post to the collaborative post for each student. The median change in score was determined. A paired or repeated measures *t* test was used to compare the mean scores on the independent posts and the collaborative posts to determine if any differences seen were significant or not. Again, the α-level will be set at .05 and the *p*-value will be compared to this α-level.

Plan for reflecting with participants on data. When student-participants were informed of the study, during week 2 of the semester, they were apprised of the opportunity to receive their MSLQ scores as a bonus of participating in the study. After

all data was collected and analyzed, there was a share session with the student-participants. At this share session, the findings of the study were summarized and their MSLQ results from the pretest and posttest surveys were returned in the form of the MSLQ Student Feedback Form shown in Appendix E. This feedback form was derived from the Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991), which provides sample response sheets to provide to students indicating what their mean was on a subscale, what the class mean was, and offers suggestions to improve in the area. These example response sheets were used as a guide to create feedback forms for the student-participants in this study. I also provided a summary of what their perceptions of collaboration were. This session gave the student-participants an opportunity to share any other feedback they had that could shape the next cycle of action research. Table 3.1 shows the timeline for data collection and analysis implemented in this research study.

Devising an action plan. The action plan is often considered the most important step in any action research study. This is the moment where the results of this study are applied to future semesters of the hybrid BIO 101 course. Mertler (2014) states, "This stage consists primarily of taking the results of your data analysis, your interpretations of those results, and the final conclusions drawn from the interpretations and formulating a plan of action for the future" (p. 210). An action plan can involve strategies for the implementation of modified instructional methods or interventions in future semesters based on the data gathered in this study. Additionally, it may propose a subsequent cycle of action research to gather more information about my problem of practice. The most critical aspect of this stage is a careful review of the findings to determine what I have

learned from this study. These findings guide future practices, and careful reflection is key.

Action research done as a mode of teacher inquiry is a cycling process which includes "a continuous set of spirals" involving identification of a problem of practice, formulation and implementation of an action strategy, evaluation of its effectiveness and subsequent identification of new "problems or areas for improvement" (Dana & Yendol-Hoppey, 2014, p. 8). This should not be seen as concluding step in a linear process, but as a bridge to a subsequent cycle.

I began this stage with a process of reflection to determine if results of this study introducing collaboration had the intended impact on student motivation. Careful review of the data was conducted to assess whether intrinsic motivation, extrinsic motivation or possibly both were affected. Collaboration will be maintained in future semesters to promote a socially strong learning environment in my online courses if significant differences in motivation of students after completing the collaboratively constructed discussion posts were seen.

I plan to investigate how to incorporate collaborative learning effectively within the course based on the results of this study. I can envision multiple scenarios including the introduction of collaboration as the sole method of completing discussion posts or the introduction of collaboration in completing a few small higher stakes projects throughout the semester. The reasoning behind the second scenario is fewer assignments will provide more time for students to collaborate amongst their groups, strengthening the community influence, while higher stakes will provide greater incentive for deeper and more active collaboration. At the conclusion of this study, I plan to conduct a period of

literature review on collaboration, looking at whether it has been determined if collaboration is best applied to low stakes or high stakes assignments.

Table 3.1 Timeline for Data Collection and Data Analyses in Spring of 2019

Week	***Action***
Weeks 1-3	Students begin the course with three weeks of individual discussion post submissions using D2L discussion forums.
Week 2	Information session in week 2 of lab, study introduced, and consent forms for student-participants signed.
Week 3	MSLQ pretest administered in week 3 of Lab
Weeks 4-5	Students organized in small groups to construct two weeks of collaborative discussion post submissions using D2L discussion forums and Google Docs.
Week 6	MSLQ posttest and Student Perception Questionnaire administered in week 6 of Lab
Weeks 7-9	Analysis of MSLQ and Student Perception Questionnaire data
Week 10	Share session with students in week 10 of lab, student feedback forms provided to student-participants

Note. The fall semester is a 15-week semester, weeks indicated are in relation to this 15-week term.

If differences in motivation are seen in this study after the period of reflection and research, I will apply an alternative introduction of collaborative learning in a subsequent semester of BIO 101. In conjunction with applying collaborative learning, I would like to measure student success and withdrawal rates for the semester and compares those rates to a section of the course taught without any collaborative activities. This will allow me

to determine specifically if collaboration leads to lower attrition and increased student success, as I suppose it may.

Conclusion

In conclusion, this was an action research study employing a pretest-posttest delivery of the MSLQ in an effort to determine if the introduction of collaborative activities into a hybrid BIO 101 course increased student motivation. Student achievement on collaborative versus independent posts was reviewed to determine if collaboration had a positive impact on assignment grades. Data assessing student-participant perception of collaborative activities was also collected. Intact sections of BIO 101 hybrid classes were used for this study. The long-term goal of this study was to determine if the introduction of instructional methodologies, like collaborative activities, in an online course, are a possible route to decreasing the current gaps seen in success and withdrawal rates in online versus traditional courses at BTC. As the numbers of online courses offered at universities and colleges increases to meet student demand, more research must be devoted to determining what instructional methodologies can be applied to the online learning environment to promote student success. Key differences in traditional and online formats of course delivery cannot be ignored when focusing on what can help students be successful in online courses.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF RESEARCH FINDINGS

This chapter presents the findings of this action research study. The chapter begins with a brief review of the problem of practice and research questions addressed with this study. This is followed by a brief description of the intervention strategy utilized to conduct the research. The data collected through the study is presented, and statistical analyses of the findings are included. This chapter closes with a summary of these findings. Details of the methodology can be found in chapter three and the significance of these findings is presented in chapter five.

Overview of the Study

This action research study was conducted to address an identified problem of practice in online and hybrid biological science courses, higher withdrawal rates and lower success rates, measured as whether a student completes a course with a passing grade, in comparison to their traditional counterparts (Hoppe, 2016). Data over the last decade has shown an impressive increase in student demand for online courses in higher education, resulting in colleges and universities steadily increasing their online offerings (Allen & Seaman, 2013). The discrepancy in withdrawal and success rates is evident in Biological Sciences I, BIO 101, a course I teach at Beachside Technical College, BTC, a Technical College in South Carolina (Hoppe, 2016).

I suspected, in accordance with recent research (Dixson, 2015), isolation might be a barrier to BIO 101 student success and persistence in online courses due to the lack of

synchronous communication and interaction amongst students in the online realm. I hypothesized the isolation barrier may be negatively influencing online student motivation and ultimately exacerbating withdrawal rates and lowering grades. Student success rates and withdrawal rates have been shown to improve when student motivation increases because motivated students invest greater time and effort in their academic endeavors leading to elevated persistence and higher academic achievement (Donaldson & Bucy, 2015; Radovan, 2011; Ryan & Deci, 2000).

In an effort to breach the isolation barrier facing online students, this study introduced collaboration amongst students into the online environment to determine if collaboration would positively influence student motivation. Collaboration has previously been shown to have a positive impact on student motivation, but the effects of collaboration have primarily been studied in the traditional classroom setting (Abrami, 2011; Donaldson & Bucy, 2016; Jagannathan & Blair, 2013; Leow & Neo, 2016). Requiring students to collaborate introduces a social element with the potential to breach the isolation felt by online students and increase their motivation, ultimately leading to greater success and persistence.

The research questions addressed by this study were

- To what extent would the introduction of collaboratively constructed discussion board posts in a hybrid Biological Sciences at a Technical College affect student-participant motivation?
- If student-participant motivation is influenced, what type of motivation, extrinsic or intrinsic, is affected?

- What are student-participant perceptions of collaboration are in an online class after completion of the collaborative activity?

These questions were formulated to investigate potential strategies to increase online student motivation in a college biology course.

Description of the Intervention Strategy

To address these questions, the intervention strategy utilized two intact hybrid sections of BIO 101 at BTC in the spring 2019 semester. The maximum enrollment of each section was twenty-two students. The total number of student-participants included in the study was twenty-six.

The section of the MSLQ measuring motivation and assessing the orientation of motivation (extrinsic or intrinsic) was administered to student-participants in the hybrid BIO 101 course before and after completing collaboratively constructed discussion board posts. The pretest was given prior to week four, the first week requiring collaboration. At this point in the semester, student-participants had completed three weeks (weeks one through three) of discussion board posts individually. The posttest was administered after week five, and students had participated in two weeks (weeks four and five) of collaboration to construct discussion posts. This pretest-posttest data was utilized to address research question one and sub-question A.

Additionally, grades on individual and collaborative discussion posts were collected to evaluate student academic achievement. I assessed whether there were changes in achievement seen when student-participants constructed posts through peer collaboration. Lastly, a questionnaire assessing student-participant perceptions of collaboration was given to students at the conclusion of the study. The intervention

strategy was designed to determine whether student motivation would be influenced by the addition of collaboration in the online portion of the course.

Research Findings

The following section will detail the number of student-participants that participated in the research study. This will be followed by a presentation of the results obtained through data collection. I will present data from the comparison of the MSLQ pretest and posttest and discuss the statistical analysis of the data. Additionally, the achievement measured by grades on the individual and collaborative discussion posts will be presented. Finally, I will detail the data collected form the questionnaire assessing the student-participant's perception of collaborative work in the online learning environment.

Student-participant population. During the second lab session of the semester, I attended both labs of the BIO 101 courses. I introduced the research study, presenting the problem of practice, research questions, and the importance of the findings to future students taking BIO 101 online. I stressed the voluntary nature of the study and presented consent forms to all students over the age of 18. In each section, there was one student under 18 years of age. Those minor students were given parental consent forms and assent form to take home and obtain parental signatures, to be returned to me the following week in lab. In total, 40 students were presented with consent forms or parental consent forms. Of those 40, 36 consented to participate by signing their consent or returning the following week with a signed parental consent and assent form.

During the third lab session, I administered the MSLQ (Appendix D) pretest to those present and consenting to participate. Prior to handing out the questionnaire, I explained all students had been assigned a random number that was written on their

pretest form. This was done to allow me to report to students on their motivation levels at the conclusion of the study, but to keep them anonymous during data collection. I briefly explained the 7-point Likert scale they would be utilizing to report their answers as well. In total, three students were absent during the pretest and one student had withdrawn from the course the previous week. In total, 32 students completed the pretest during the lab session.

Finally, during the sixth weekly lab session, after the student-participants had completed two weeks of collaboratively constructed discussion posts online, I visited their lab session again and administered the MSLQ posttest as well as the student perceptions of collaboration questionnaire (Appendix F). The MSLQ was again labeled with the student's random number assignment, while the student perception questionnaires were kept fully anonymous. Three students in one section and two in the other section were absent during the sixth lab session, and one additional student had withdrawn from the course. The total number of student-participants who completed the study was N=26.

MSLQ results. Within the portion of the MSLQ assessing student motivation, there are six subscales, originally presented in Table 2.1. The subscales assess intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance, and test anxiety. To score the MSLQ, each subscale was assessed individually. The average of all student responses on each item was determined and then the mean of those averages was found as instructed by the MSLQ Manual (Pintrich et al., 1991). Once the pretest and posttest means were determined for each of the subscales, two-tailed paired *t* tests were utilized to determine

if any differences seen between the pretest and posttest means were significant or not. The *p*-value was set at .05. The data resulting from this analysis is presented in Table 4.1. No significant increase or decrease was seen in any of the six motivation subscales after introduction of the collaborative activity.

Table 4.1 T test of the Six MSLQ Subscale Scores for Pretest and Posttest for all Student-participants (N=26)

	Mean (Std)				
Subscale	***Pretest***	***Posttest***	***df***	***t Stat***	***p***
Intrinsic Goal Orientation	5.23 (1.42)	5.25 (1.32)	103	-0.15	0.88
Extrinsic Goal Orientation	5.81 (1.69)	5.81 (1.51)	103	0	1
Task Value	5.69 (1.45)	5.65 (1.37)	155	0.37	0.71
Control of Learning Beliefs	5.80 (1.50)	5.96 (1.25)	103	-1.04	0.30
Self-Efficacy for Learning & Performance	5.36 (1.42)	5.25 (1.52)	207	1.52	0.13
Test Anxiety	4.55 (2.14)	4.75 (2.01)	129	-1.07	0.29

Notes. *$p < .05$, two-tailed paired *t* test, degrees of freedom represents all questions within that subscale answered by the 26 student participants minus 1.

Intrinsic goal orientation. Goal orientation refers to how a student perceives their reasons for engaging with the course material and learning tasks. When goal orientation is intrinsic, students are engaged and participating for reasons such as enjoyment, curiosity, or mastery (Pintrich et al., 1991). Each subscale was then assessed individually by looking at the average of the student-participant responses for each item on the pretest and comparing it to the average of the posttest responses. Two-tailed paired *t* tests were again utilized and as is shown in Table 4.2, none of the four items within the intrinsic goal orientation subscale changed significantly because of the introduction of collaboration online.

Table 4.2 T test of the Intrinsic Goal Orientation Items between Pretest and Posttest MSLQ for all Student-Participants (N=26)

Item	Mean (Std) Pretest	Posttest	df	t Stat	p
1. In a class like this, I prefer course material that really challenges me so I can learn new things.	4.69 (1.19)	5.12 (1.40)	25	-1.84	0.08
16. In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.	5.19 (1.77)	5.31 (1.38)	25	-0.38	0.71
22. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.	5.85 (1.05)	5.80 (0.99)	25	0.36	0.72
24. When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good grade.	5.19 (1.39)	4.81 (1.36)	25	1.51	0.14

Notes. $*p < .05$, two-tailed paired *t* test, items presented to students on a 7-point Likert scale.

Extrinsic goal orientation. When a student's goal orientation is extrinsic, their reasons for engaging with the course material are external, including rewards like grades and approval of others (Pintrich et al., 1991). Four items comprise the extrinsic goal motivation subscale. As can be seen in Table 4.3, the averages of the student-participant responses on the pretest and posttest items within the scale were compared, utilizing a two-tailed paired *t* test for each item. There were no significant changes in the extrinsic goal orientation items because of the introduction of collaboration.

Table 4.3 T test of the Extrinsic Goal Orientation Items between Pretest and Posttest MSLQ for all Student-participants (N=26)

	Mean (Std)				
Item	***Pretest***	***Posttest***	***df***	***t Stat***	***p***
7. Getting a good grade in this class is the most satisfying thing for me right now.	6.04 (1.43)	6.08 (1.26)	25	-0.15	0.88
11. The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade.	5.65 (1.90)	6.00 (1.17)	25	-0.95	0.35
13. If I can, I want to get better grades in this class than most of the other students.	5.65 (1.70)	5.65 (1.65)	25	0	1
30. I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.	5.50 (1.77)	5.65 (1.88)	25	-0.45	0.66

Notes. *$p < .05$, two-tailed paired *t* test, items presented to students on a 7-point Likert scale.

Task value. Task value assesses how students value the importance of the course content, including their level of interest in the material and how useful they predict it will be (Pintrich et al., 1991). Six items addressed the student-participant's perception of the value of tasks within the course. Again, *t* tests were employed to compare the averages of the student-participant responses on the pretest and posttest responses. Table 4.4 shows that there were no significant changes seen in the student-participant perceptions related to task value.

Table 4.4 T test of the Student Perceptions of Task Value Items between Pretest and Posttest MSLQ for all Student-participants (N=26)

	Mean (Std)				
Item	***Pretest***	***Posttest***	***df***	***t Stat***	***p***
4. I think I will be able to use what I learn in this course in other courses.	5.77 (1.53)	5.77 (1.37)	25	0	1
10. It is important for me to learn the course material in this class.	6.12 (1.51)	6.15 (0.88)	25	-0.17	0.87
17. I am very interested in the content area of this course.	5.23 (1.68)	5.12 (1.61)	25	0.59	0.56
23. I think the course material in this class is useful for me to learn.	5.69 (1.32)	5.81 (1.23)	25	-0.53	0.60
26. I like the subject matter of this course.	5.62 (1.36)	5.19 (1.52)	25	2.10	0.05
27. Understanding the subject matter of this course is very important to me.	5.69 (1.29)	5.89 (1.24)	25	-0.96	0.35

Notes. $*p < .05$, two-tailed paired *t* test, items presented to students on a 7-point Likert scale.

Control of learning beliefs. Student perception of control of learning refers to their beliefs of whether or not the effort that they exert in a course will result in a positive result (Pintrich et al., 1991). Four items comprise the control of learning beliefs subscale and Table 4.5 presents the results of the data analysis. *T* tests evaluating the differences in the averages of student-participant responses on the pretest and posttest showed no significant changes after collaboration was introduced online.

Table 4.5 T test of the Student Control of Learning Beliefs Items between Pretest and Posttest MSLQ for all Student-participants (N=26)

	Mean (Std)				
Item	***Pretest***	***Posttest***	***df***	***t Stat***	***p***
2. If I study in appropriate ways, then I will be able to learn the material in this course.	6.19 (1.30)	6.35 (0.94)	25	-0.54	0.60
9. It is my own fault if I don't learn the material in this course.	5.92 (1.44)	6.19 (0.90)	25	-0.96	0.35
18. If I try hard enough, then I will understand the course material.	6.00 (1.44)	6.08 (1.09)	25	-0.27	0.79
25. If I don't understand the course material, it is because I didn't try hard enough.	5.08 (1.65)	5.23 (1.68)	25	-0.39	0.70

Notes. $*p < .05$, two-tailed paired *t* test, items presented to students on a 7-point Likert scale.

Self-efficacy for learning and performance. This subscale addresses student expectations for performance in the course and their own belief of whether they are capable of mastery in the class (Pintrich et al., 1991). Eight items comprise these two expectancy aspects. Table 4.6 shows the paired *t* test results for each item determining if differences in pretest and posttest averages were significant. One item, number 29, did show a significant change. This item states, "I'm certain I can master the skills being taught in this class". The pretest average was 5.58, and was significantly higher than the posttest value of 5.08 with a *p*-value of 0.02 indicating students were feeling less confident in their ability to master the course content.

Table 4.6 T test of the Student Self Efficacy for Learning and Performance Items between Pretest and Posttest MSLQ for all Student-participants (N=26)

	Mean (Std)				
Item	***Pretest***	***Posttest***	***df***	***t Stat***	***p***
5. I believe I will receive an excellent grade in this class.	5.08 (1.44)	5.04 (1.59)	25	0.20	0.85
6. I'm certain I can understand the most difficult material presented in the readings for this course.	4.62 (1.72)	4.66 (1.52)	25	-0.17	0.87
12. I'm confident I can learn the basic concepts taught in this course.	6.08 (1.06)	6.04 (1.31)	25	0.17	0.87
15. I'm confident I can understand the most complex material presented by the instructor in this course.	4.88 (1.31)	5.08 (1.57)	25	-1.04	0.31
20. I'm confident I can do an excellent job on the assignments and tests in this course.	5.27 (1.34)	5.19 (1.55)	25	0.40	0.69
21. I expect to do well in this class.	5.81 (1.39)	5.54 (1.10)	25	1.43	0.17
29. I'm certain I can master the skills being taught in this class.	5.58 (1.24)	5.08 (1.70)	25	2.39	0.02*
31. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.	5.58 (136)	5.39 (1.58)	25	0.93	0.36

Notes. *$p < .05$, two-tailed paired *t* test, items presented to students on a 7-point Likert scale.

Test anxiety. The final subscale assesses student test anxiety, and is included within the motivation subscales due to negative correlations found between test anxiety and student achievement and expectancy (Pintrich et al., 1991). Table 4.7 presents the

data analysis of the five items comprising the test anxiety subscale. The *t* test revealed no significant changes in student's levels of test anxiety after the introduction of collaborative activities online. Interestingly, the standard deviation seen with the test anxiety subscale overall was the largest of all deviations seen with the six subscales, indicating a wide level of variation in student's level of test anxiety.

Table 4.7 T test of the Test Anxiety Items between Pretest and Posttest MSLQ for all Student-participants (N=26)

	Mean (Std)				
Item	***Pretest***	***Posttest***	***df***	***t Stat***	***p***
3. When I take a test I think about how poorly I am doing compared with other students.	3.89 (2.55)	4.31 (2.22)	25	-0.85	0.41
8. When I take a test I think about items on other parts of the test I can't answer.	4.69 (1.93)	5.00 (1.77)	25	-0.98	0.33
14. When I take tests I think of the consequences of failing.	5.23 (1.77)	5.50 (1.42)	25	-0.67	0.51
19. I have an uneasy, upset feeling when I take an exam.	4.46 (2.00)	4.54 (2.12)	25	-0.19	0.85
28. I feel my heart beating fast when I take an exam.	4.50 (2.27)	4.39 (2.26)	25	0.30	0.77

Notes. $*p < .05$, two-tailed paired *t* test, items presented to students on a 7-point Likert scale.

Student achievement on individual and collaborative posts. Grades on the student's individually constructed discussion posts and collaboratively constructed posts were averaged as a measure of student achievement. I chose to utilize two weeks of individually submitted posts (weeks two and three) because I was also evaluating two weeks of collaborative posts (weeks four and five). I also chose not to utilize week one submissions as that week's discussion post is used as a tool for students to introduce

themselves to the class and describe past online and science lab experiences. Week two is the first discussion submission utilizing a prompt that is related to the course content.

I averaged the grades for weeks two and three, the individual submissions, omitting zeros for students who did not post and then averaged again including the zeros. I repeated this process for the collaborative posts submitted in weeks four and five. The class average of the posts omitting zeros was 91.94 for the individual weeks and 90.97 for the collaborative weeks. The class average when the zeros were included was 86.53 for individual submissions and 82.94 for collaborative submissions. Figure 4.1 shows these class averages graphically. A paired two-tailed *t* test was performed to determine if the small differences in achievement were significant and they were found not to be.

However, there were a greater number of zeros on the collaboratively constructed posts. In weeks two and three, there were two students each week who received a zero for lack of participation. During weeks four and five, there were three students each week who received zeros for not participating in the group post. Additionally, on the individual weeks, a student could not access the discussion board until they posted as it was set as "post first submissions only." However, on the collaborative weeks, the posts were constructed via Google Docs, which allowed students to reply to classmate's group posts regardless of their participation within their own group. An additional two students in both week four and week five replied to classmates but did not participate with their group.

Student-participant perception of collaboration online. During the sixth lab session when students completed the posttest for the MSLQ, they also completed a questionnaire to evaluate their perceptions of online collaborative activities. The

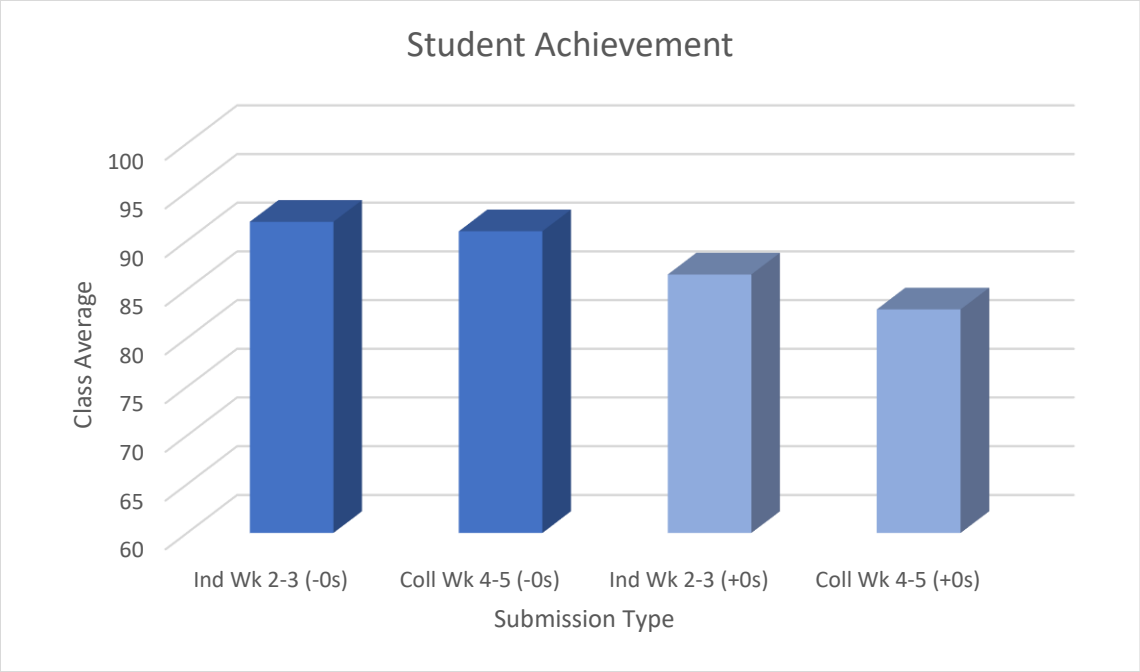

Figure 4.1. Class average of scores on individually constructed posts weeks two and three and collaboratively constructed posts weeks four and five, averages shown inclusive of zeros and without zeros.

questions were designed to address collaboration in online courses in general as well as specifically for the collaborative discussion post activity they participated in. The questionnaire can be seen in Appendix F.

The first questions addressed previous collaborative experiences in online courses. Students were first asked if they had taken online courses previously utilizing collaborative activities, and only five of the 26 student-participants (19%) reported they had. Of the five that reported yes to the first question, 100% answered yes when asked if they felt those collaborative activities were beneficial to learning. They were then asked if the collaborative activities they had participated in were enjoyable and only three of the five (60%) felt that they were.

The next series of questions used a Likert-type scale from one to five, with one labeled as not at all true and five as extremely true. Table 4.8 shows the median value

and standard deviation for each question, N=26. Table 4.9 displays the percentage of responses for each answer type for each of the ten questions. When asked if they felt they learned well when working within a group to construct discussion posts, the majority response was neutral and relatively similar proportions of students responded extremely true or not at all true. The same response pattern was seen when students were asked about the ease of communication with their classmate's in constructing the group posts, with the majority responding neutral but with similar proportions of students responding extremely true and not at all true. This indicates student's belief in effective learning through collaboration and their ease of communication were not an issue for some students, but definitely were problematic for others.

When asked about their level of concern for their grade when working with other classmates, the majority of responses were extremely true, 40%. This indicates, despite the peer evaluation, they were concerned about the influence of other students on their grade. When asked if they enjoyed working with a group, 50% of the students answered not at all true or not true while 31% reported extremely true they enjoyed group work. Most students found working within the groups to complete the assignment to be more difficult than working individually, with 38% of student-participants answering extremely true and 27% answering true. Despite the perceived difficulty with group work, 31% of student-participants responded extremely true and 27% responded true when asked if all of their group members contributed in a valuable way to the discussion post.

Table 4.8 Results of the Student Perception of Collaboration Questionnaire for all Student-participants (N=26)

Item	*Median*	*StDev*
I found I learned well when constructing discussion posts as a group.	3	1.25
I was concerned about my grade being affected by my classmates in the group activities.	4	1.39
I enjoyed working with a group to complete discussion posts.	3	1.33
I signed up for online coursework anticipating I would not have to work with classmates.	4	1.27
I found it easy to communicate with my classmates to construct the group discussion posts.	3	1.41
I prefer to work alone.	5	0.85
All of my group members contributed in a valuable way to the discussion post.	4	1.45
GoogleDocs was a good tool for group work in an online class.	5	0.84
Completing discussion posts as a group was more difficult than working alone.	4	1.27
I would like to have collaborative activities in other online courses.	1	1.32

Note. Items were presented on a 5-point Likert-type scale

Table 4.9 Results of the Student Perception of Collaboration Questionnaire for all Student-participants (N=26)

Item	*Extremely True (%)*	*True (%)*	*Neutral (%)*	*Not True (%)*	*Not at all True (%)*
I found I learned well when constructing discussion posts as a group.	12%	23%	**31%**	19%	*15%*
I was concerned about my grade being affected by my classmates in the group activities.	**40%**	12%	28%	8%	*12%*
I enjoyed working with a group to complete discussion posts.	4%	27%	19%	15%	***35%***
I signed up for online coursework anticipating I would not have to work with classmates.	**31%**	27%	23%	12%	*8%*
I found it easy to communicate with my classmates to construct the group discussion posts.	23%	15%	**35%**	8%	*19%*
I prefer to work alone.	**58%**	19%	23%	0%	*0%*
All of my group members contributed in a valuable way to the discussion post.	**31%**	27%	15%	12%	*15%*
GoogleDocs were a good tool for group work in an online class.	**54%**	23%	23%	0%	*0%*
Completing discussion posts as a group was more difficult than working alone.	**38%**	27%	19%	8%	*8%*
I would like to have collaborative activities in other online courses.	4%	15%	19%	8%	***54%***

Note. Items were presented on a 5-point Likert-type scale, bolded percentage indicates largest response rate

When asked if their preference was to work alone, 58% of the student-participants responded extremely true and 19% responded true indicating an overwhelming majority of the students would prefer to work by themselves and not within a group. Additionally, when asked if their choice to take classes online included an expectation to not have to work with classmates, 31% answered extremely true and 27% responded with true. The student-participant responses when asked if they felt Google Docs was a good tool for online group work were overwhelmingly positive, with 54% of responses being extremely true and 23% being true. Finally, when asked if they would like to have collaborative activities in other online courses, 62% of the student-participants responded with not at all true or not true, while only 19% responded with true or extremely true.

The last three questions of the student perception questionnaire allowed students to respond to open-ended questions. In order to analyze this data, I manually reviewed and coded the data, looking for emerging themes in the responses provided by student-participants. Basit (2003) states, "The object of analysing qualitative data is to determine the categories, relationships and assumptions that inform the respondents' view of the world in general, and of the topic in particular" (143). The coding process began by transcribing all open-ended answers into an excel spreadsheet. Responses were relatively small in number with 26 student-participants, and some opting to leave these open-ended questions blank or answering with responses like "I don't know." The coding process included a first step of looking for common themes or categories of the responses provided, which was followed by color coding responses to themes. The process of coding the qualitative data organized the responses allowing me to see that substantive

student-participant responses all fell within easily identifiable themes that I will identify as I discuss the qualitative data.

The first question asked what the greatest challenge was with working collaboratively in an online course. Three common themes emerged across the student-participant responses: communication issues, participation of group members, and time management. Two students reported having technical issues with the Google Doc that impaired their ability to work within the group and one student responded "I don't' know". Two students did not respond to the question.

Student-participant responses indicating communication was a challenge included frustration with waiting for responses from group members and difficulty knowing how to contact group members. One student-participant stated the greatest challenge was "communicating and waiting for responses via email. Other students waited until hours before the deadline to complete the assignment and I almost got on and finished it myself." Another reported the greatest challenge was "not meeting face to face and wondering and waiting for a response."

Student-participants who reported their greatest challenge with the collaborative activity related to work load expressed frustration with group members who did not do their portion of the work or difficulty in knowing how to distribute the workload most effectively. One student-participant stated, "The biggest challenge was to get a certain group member to do work," while another said "Getting others to do their work or respond to emails." Another student-participant reported, "It was difficult to decide on who contributed what as we all joined at varying times. It was a matter of respecting ones work while also contributing."

When reporting the greatest challenge to be related to time management, student-participants felt they struggled to find time to communicate and work on the assignment. One student participant stated the greatest challenge was "Time to work on assignments (my time)" while another said, "Everyone has a different schedule and works at a different pace." Another student-participant said, "Time management, I found myself trying to find time to work on the assignment. When I did have time, the whole assignment was completed."

Student-participants were then asked what they thought the greatest advantage was to working in a group. The common themes evident in their responses were reduced workload, the ability to see new perspectives from group members, and the social benefit of connecting with other students. Two students did not answer the question and one student answered "none." Students who felt the reduced workload was an advantage commented the advantage was "less work" and "when group cooperates it was fun and easy."

The ability to see new perspectives on assignments was by far the most reported advantage of collaboration. One student-participant responded the advantage was, "You can brainstorm on different perspectives and create new insight when groups actually communicate together." Another student-participant stated the advantage was, "It helps because you have different examples and views that can help you understand a topic better," and another stated, "Different minds made the assignment more creative and unique."

Students were also able to see the social benefit to collaborating within a group on an assignment, stating, "You get to connect with classmates and see how they learn and

describe things." Other student-participants reported, "Improving one's communication skills is an advantage" and another stated the advantage was "Networking, sometimes online classes are missing this."

Finally, student-participants were asked if there were improvements that they could suggest for collaborative activities in future sections of the BIO 101 hybrid course. While this particular question was the least answered with only sixteen responses, and four of those were stated there were no suggestions, the students offered a variety of excellent suggestions to improve the collaborative activities. A student-participant suggested, "Maybe just show a quick tutorial of how to use Google Docs beforehand." This indicated to me while I described how to use Google Docs, providing a video of myself reviewing the application and its features and/or adding an available tutorial for Google Docs provided by Google could ease some of the initial frustrations in deadline with a new application.

Other suggestions addressed the timing of the collaborative activities, one student suggested moving the assignments to later in the semester so students would have become more comfortable with the course and each other prior to the introduction of the activities and another suggested not doing the collaborative weeks back to back, to instead spread them out through the semester. Both of these suggestions highlighted the impact the timing of the collaboration could have on the success of collaborative activities. Two students suggested if collaboration was used in future terms, I should assign the workload to the group members instead of allowing them to distribute the work. One student-participant stated, "Assign the parts so if someone doesn't do theirs,

then the others don't suffer or worry." This would ease the concern over grades if one person does not complete their part.

Another suggestion presented by more than one student-participant was to redistribute students into new groups after the first week of collaboration. One student-participant said, "Switch up the groups instead of keeping the same for both posts" and another stated, "Switch the groups around if there are going to be more than one week of collaborative activities." The advantage to this would be new social connections and new perspectives when new groups are formed. Additionally, it would reduce the stress students felt when a group member did not participant in the first week; they would not be grouped with that same student in the next round. Unfortunately, it was evident the students who did not participate in the first week of collaboration also did not participate during the second week, frustrating their group members for two consecutive weeks.

Analysis of Data Based on Research Questions

These research questions addressed by this study were formulated to investigate potential strategies to increase online student motivation in a college biology course. The research questions addressed by this study were

- To what extent would the introduction of collaboratively constructed discussion board posts in a hybrid Biological Sciences at a Technical College affect student-participant motivation?
- Sub-question A asked, if student-participant motivation is influenced, what type of motivation, extrinsic or intrinsic, is affected?

- Sub-question B asked what student-participant perceptions of collaboration were in an online class after completion of the collaborative activity?

As could be seen by the MSLQ pretest and posttest data analysis, there were no significant changes to student-participant motivation with the introduction of collaboratively constructed discussion board posts in weeks four and five of the online BIO 101 course.

None of the six subscales showed a significant change, however one item within the self-efficacy for learning and performance subscale that assessed student confidence in their ability to master course material did change significantly, dropping .5 points, indicating reduced confidence in mastery.

Additionally, it was evident there was a wide range of variation in student's level of test anxiety as that subscale displayed the largest standard deviation values. Achievement did not change significantly when students were working in a group to construct their collaborative posts rather than working individually. The class average was higher for the individually constructed posts when calculated with zeros included and when averaged without the zeros, but the difference was not significantly higher than the collaborative averages. The number of students who did not participate increased when comparing the individual and collaborative posts. Two students each individual post week and three students each collaborative post week did not participate.

It was evident that few (19%) of the students had taken online courses before that utilized collaborative activities online, but those that had found the collaboration benefited learning (100%) but only 60% of respondents enjoyed them. Student-

participant responses indicated students were concerned about collaboration affecting their grades, and divided on whether they enjoyed the experience (50% negative and 31% positive). Most (65%) student-participants found the group work more difficult and most (58%) reported their entire group participated. The overwhelming majority of respondents approved of Google Docs as a fitting application for collaboration online. Most students preferred to work alone (77% extremely true or true) and 58% of the student-participants indicated they expected to not have to work with classmates online.

The three most commonly reported challenges with collaboration online were related to time management, group member participation and communication difficulties. The advantages seen by the student-participants were the introduction of socialization online, the ability to see new perspectives from classmates and a reduction of workload across the group. Finally when asked if there were suggestions for improving the collaborative activity students suggested adjusting the timing of the activities to nonconsecutive weeks and later in the semester. Students also wanted to see a rearrangement of the group members after the first round of collaboration. Lastly, it was suggested I assign the workload to the group members to avoid certain students compensating for other student's lack of participation. I found all of these suggestions to be very beneficial as I am planning how to improve the collaborative activities for upcoming semesters.

Conclusion

Chapter four has presented the findings of this action research study and the analysis of the data collected. While the findings did not show an increase in student-participant motivation after the introduction of collaboration in the online course, as was

anticipated, they did however provide me with valuable data to use as I refine the use of collaboration in my online courses.

These findings are instrumental as I consider how to improve the introduction, organization, and duration of collaboration for future semesters. Action research in its very design has the "purpose to improve one's own professional judgment and to give insight into better, more effective means of achieving desirable educational outcomes (Mertler, 2014, p.13). The data collected for this study will be incorporated into an action plan to lead me into subsequent cycles of action research. This action plan will be presented in chapter five.

The benefits of student collaboration are numerous, and future research will be designed to determine if modified implementation will maximize benefits for my online biology students. Chapter five will discuss in more detail the implications of these findings, including the limitations of the current study, as well as suggestions for future research into collaboration in my online courses and the limitations present in this current study.

Chapter Five

Discussion and Action Plan

In this final chapter, an overview this action research study is described first, including a review of the problem of practice, research question, and purpose of the action research conducted. The intent of this chapter is to present an interpretation of the research findings described in chapter four, referring back to the literature review in chapter two that provided the theoretical foundation for this study. Finally, an action plan is proposed and suggestions for future research are included. Additionally, the limitations of this study will be reviewed.

Overview of the Study

Increased demand for online course offerings in higher education has been a growing trend over many years, and students completing coursework online has tripled over the last decade (Allen & Seaman, 2013). This demand has been apparent in the technical and community college sphere where many students are nontraditional in nature, and as such, online coursework suits their family and work obligations. Addressing the quality of online courses offered and the success of students in these courses is of primary importance to higher education institutions.

The identified problem of practice, which precipitated this action research study, is decreased student success rates and higher withdrawal rates in online courses when compared to their traditional counterparts, as can be seen in Table 1.1 and Table 1.2. In BIO 101, a course I teach as an online lecture the discrepancy is apparent with student

success rates being 12-21% different between online and traditional sections between 2015 and 2016 (Hoppe, 2016). Withdrawal rates have also been shown to be higher in the online sections of BIO 101. These trends are replicated across all of the science courses offered in the online format at the college.

The purpose of this action research study was to investigate whether or not the introduction of collaboration in online classes could attenuate these discrepancies by influencing student motivation positively. By its very nature, online course work can be isolating. Dixson (2015) states isolation in online classes can become a barrier to student success, and collaboration by its very nature can potentially breach the isolation barrier. Moreover, collaborative learning has been shown to positively correlate with student motivation, and therefore was identified as an appropriate tool in this study (Abrami, 2011; Donaldson & Bucy, 2016; Jagannathan & Blair, 2013; Leow & Neo, 2016).

The research question I asked was "To what extent would the introduction of collaboratively constructed discussion board posts in a hybrid biological sciences course at a technical college affect student-participant motivation?" Additionally, two subquestions were posed "if student-participant motivation is influenced, what type of motivation (extrinsic or intrinsic) is affected" and "what are student-participant perceptions of collaboration in an online class after participating in a collaborative activity?"

To address these questions, I administered the motivation section of the MSLQ before and after student-participants completed two weeks of collaboration in the online environment. The results on the pretest and posttest were compared through statistical analyses and descriptive statistics were presented in detail in chapter four. To answer the

second subquestion posed, investigating student-participant perceptions of collaboration, I administered a questionnaire. The questionnaire was designed to assess if student perceptions changed after their participation in the collaborative activities and if they felt the collaboration was enjoyable or beneficial. Finally, student-participant achievement data on the collaborative and individually constructed discussion posts were compared.

Interpretation of the Research Findings

A detailed presentation of the research findings was presented in chapter four. In this section, I will discuss the findings through the perspective of the literature reviewed in chapter two. I will begin with a summary of the findings followed by a discussion of the findings in relation to student motivation and collaboration.

Summary of the findings. Comparison of the pretest and posttest MSLQ data indicated no significant change was seen, negatively or positively, in student motivation after the implementation of collaboration in the online class. The only exception was a single question within the self-efficacy for learning and performance subscale, which showed a significant, albeit small change from 5.58 down to 5.08 after collaboration was introduced. This could simply be attributed to the increase in difficulty of the material as the students moved from the first unit covering less difficult concepts to the second unit that addresses more complex information.

When achievement on the individual and collaboratively constructed discussion posts were compared, through averaged class scores, it was clear there was no significant difference in the class average based on submission type. I did find there were a greater number of students who received zeros on the collaborative posts due to lack of participation in their group's submission. I suspect that some students did not participate

because they may have viewed the collaboration as too time consuming or difficult. Others may have thought there was little to gain from the experience or that the collaboration exceeded their anticipated coursework in an online course. These students instead chose to receive a zero on those week's posts.

When data from the student perception of collaboration questionnaire was assessed, it was evident collaboration in online courses is not common, only one in five reported seeing it in a previous course. However, those that had, agreed 100% it was beneficial to learning. Students were split on the ease of communication within groups and their level of learning through collaboration. Additionally, they were concerned with the grade on a collaborative submission. Half of the student-participants reported they did not enjoy collaborating with classmates, but one third did. Finally, most students found constructing posts collaboratively more difficult despite most reporting their group members contributed in a valuable way.

When reporting what they found to be the greatest challenge with collaboration, student-participants repeatedly cited communication issues, group member participation, and time management. The reported benefits included reduced workload, social connection, and the ability to see new perspectives. Suggestions for improving the collaborative activities included a Google Docs tutorial, rearranging the students into new groups for each activity, assigning the work to the students, and altering the timing of the collaboration to inconsecutive weeks.

The findings of this action research study and motivation. Motivation was the chosen dependent variable of this study due to the published findings indicating students who are motivated are more successful academically, and more likely to persist and finish

courses (Bolakn, 2015; Decia, Koestner & Ryan, 2001; Radovan, 2011; Ryan & Deci, 2000). Motivation, defined as a construct in chapter two, is the driving force that keeps an individual interested, engaged, and active in a pursuit. Defined in this DiP as "the process whereby goal directed activity is instigated and sustained (Schunk et al., 2008, p. 4).

My experience with teaching online courses over many years led me to suspect there was greater potential for online students to become unmotivated and therefore withdraw or not achieve academic success in the course. Without the biweekly interaction with their lecture instructor and classmates a traditional student receives, they are prone to isolation and lack social interaction.

The statistical analysis of the MSLQ data showed no significant change in the motivation levels of the student-participant's pre and post collaboration as was evidence by the p values. I did see minor changes that while not statistically significant may provide insight and I present them here as trends seen in the data not as significant changes.

It was clear from the responses to the intrinsic goal orientation items the student-participants prefer to be challenged (question one, Table 4.2). Additionally, the responses to the question assessing enjoyment of activities that arouse curiosity increased (question sixteen, Table 4.2). This is interesting to me because it indicates if a student is interested, the difficulty of the work may not be perceived as a barrier.

However, the responses to item twenty-four indicated if a student is allowed to choose, they prefer less difficult tasks that potentially provide better grades, indicating challenge is not as important as the grade. This reinforces the importance students place

on the grades they receive. This is supported by the responses to question eleven shown in Table 4.3 indicating that students became more concerned with getting a good grade in the class to improve their overall GPA.

In Table 4.4 the changes in the responses to questions assessing the student-participant's perceptions of the task value are shown. It is clear there was an increase in their perception of the tasks being useful and that comprehension of the subject matter became more important. However, there was a decrease in the responses evaluating how student-student participants liked the subject matter.

In the items assessing how much control student-participants feel they had over learning, it was evident they felt the responsibility if they did not perform well was theirs alone, but also believed studying appropriately would allow them to learn the material (questions two and nine, Table 4.5). This indicated to me that student-participants took responsibility for their learning and understood the effect that studying could have on their comprehension. Again, these changes were not statistically significant but were notable changes in the data.

While the MSLQ findings of this study showed no significant change in student-participant motivation levels after the introduction of collaboration, I was surprised at the level of motivation students reported on the MSLQ pretest and posttest, which was higher than I had seen in the majority of studies in the literature. When comparing the posttest MSLQ means from my sample I found they exceeded those reported by Pintrich, Smith, Garcia, McKeachie, & Hancock (2004) on every sub-scale with the exception of one, self-efficacy for learning and performance, shown in Figure 5.1. While the margins were small, this difference was encouraging to me, as it indicates the students enrolled in my

online BIO 101 course are not unmotivated in comparison to a large population of college students taking classes in the traditional format.

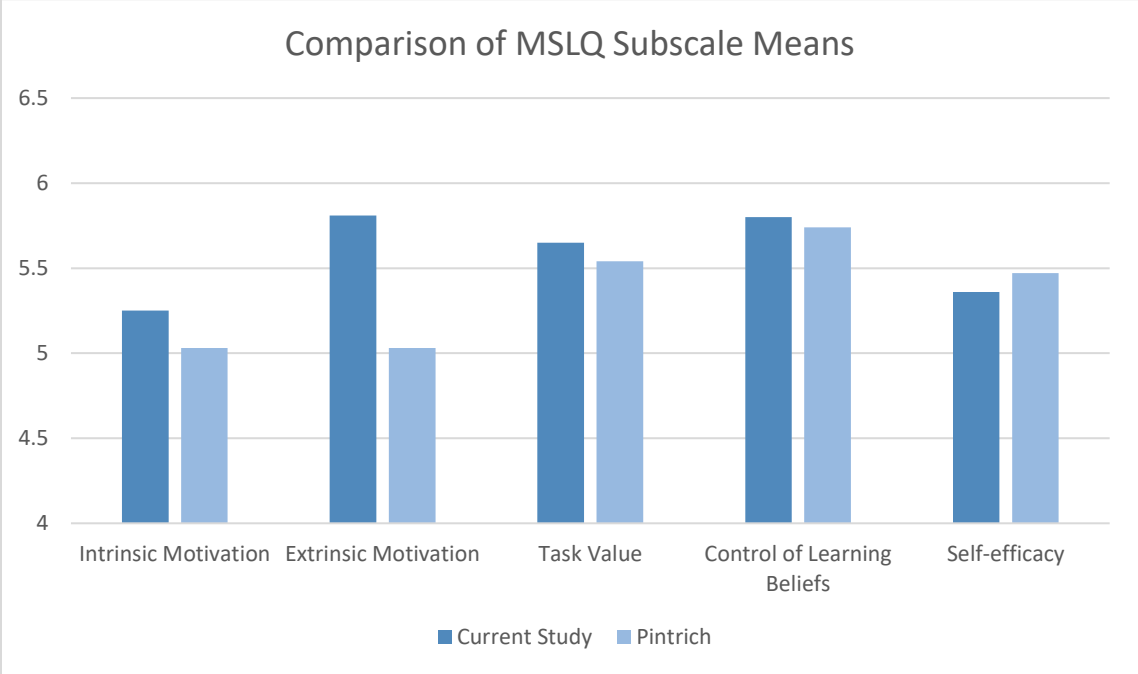

Figure 5.1. Comparison of MSLQ sub-scale means from this study to findings published by Pintrich, Smith, Garcia, McKeachie, & Hancock (2004) utilizing a large sample of 380 Midwestern college students.

Therefore, while I did not see a significant increase in motivation through my introduction of two weeks of collaborative activities in the online portion of the course, my students are motivated. As I discussed in Chapter two, there is a gap in the research in comparing motivation levels of online students to traditional students, the very nature of the two different populations being traditional vs. online makes it difficult to ascertain if comparing these two different populations would provide conflicting or ambiguous data. However, Rovai et al. reported that online students had greater levels of intrinsic motivation (2007). A future step in my action research will be to compare MSLQ motivation levels in face-to-face and online sections to determine if any differences are seen at the start of the semester and at the conclusion of the semester comparing students

who have persisted. I anticipate while online students may be prone to losing motivation and withdrawing, those that persist and finish the course may show overall higher levels of motivation than their face-to-face counterparts do.

The findings of this action research study and collaboration. The independent variable of this action research study was collaboration in online course work. Collaboration as an instructional tool has its foundation in social constructivism, requiring students to collaborate to construct a final product as a group. Collaboration promotes social interaction, a condition often absent or superficial in online coursework, noted by one of the student-participants in this study when they stated, the advantage to collaboration was "Networking, sometimes online classes are missing this."

Social constructivism formed the foundational theoretical framework of this study. It has its beginnings with John Dewey in the 1960s and Vygotsky in the 1970s. The social constructivist view of learning is learning is not an isolated phenomenon, by our very

This study introduced social interaction through the creation of small groups requiring students to construct discussion post replies collaboratively for two consecutive weeks using Google Docs. The requirement of collaboration added a level of difficulty in communicating with group members asynchronously, evidence by communication barriers being reported as one of the three primary difficulties in working as a group. The communication issues reported by some students added to frustration, increased concern

over grades on the project, and ultimately led to a few students completing the work with only one or two participants.

This challenge is something I will focus on lessening in future semesters by creating an instructional video for Google Docs illustrating the chat feature of the program and how to utilize the software. Additionally, I will allow a longer time frame for the production of the posts as it seems that when students were allowed a week, it took days for some of the groups to initiate communication asynchronously, and distribute the work, leaving little time for completion of the actual project. I think attention to lessening the communication difficulties would improve the collaborative activity's participation rate and the enjoyment for the students.

The students were able to recognize the benefit of sharing ideas through collaboration, as this was the most cited advantage to collaboration. Interactions between students open the door for the "sharing of ideas" which "are what establish a learning community where students come to understand the basis for their social and cultural identities (McKinley, 2015, p. 198). One student reported, "It helps because you have different examples and views that can help you understand a topic better."

This remains one of the greatest perceived values to me of incorporating collaboration even in an online class when it may be more difficult. I continue to be convinced the social interaction of students is incredibly important to their motivation, persistence, and academic achievement, and I will continue to implement collaboration in future semesters, but I will focus on removing or attenuating the reported difficulties seen with this study.

Implications of this Action Research Study

It was evident the introduction of collaboration as it was done in this study had no appreciable effect on student-participant motivation and the majority of student-participants reported that they did not enjoy collaborating on assignments. Student-participants overwhelmingly reported one of the expectations when taking classes online is they would not have to work with classmates. They had trouble communicating with group members and expressed frustration with group members who did not participate in the activity.

What was eye opening for me was that some students did enjoy the activity and found it beneficial, with 35% answering true or extremely true when asked if they learned well, and 31% answering true or extremely true that they enjoyed the activity. Only 19% reported they would like to have collaborative activities in the future. This indicates to me, the way I introduced the collaboration potentially had a negative effect on the outcome. I utilized two consecutive weeks of collaboration, using the same group composition both weeks, and only allowed for one week for each assignment to be completed.

If an instructor is planning to introduce collaboration in an online class, they should be aware that the parameters of the activity are critical to student perception and participation. As reported by Almajed, "CL contexts are complex and affected by various factors" and "students' personality and preferences impact the learning environment, with levels of engagement varying depending on perceived reactions of colleagues" (2016, p. 68). My implications are focused on introducing collaborative

activities in a way that could improve the outcomes for students by lessening the challenges that were reported most often by my student-participants.

When utilizing a new technology, as I did for the collaborative activities with Google Docs, removing barriers by providing training up front can lessen the learning curve a new user may experience. The findings of this study indicated some users struggled learning how to use Google Docs and although I provided a link to a Google Docs tutorial in the news item announcing the project and assigning the groups, this was not enough for some students. I also am left suspicious some students who did not participate may not have done so due to technological difficulties. Instructors should be attentive to personalized training for new tools and creating a training video allowing me to walk my students through the most important features of the program, especially showing them the tools that allow communication within the Doc, can provide a smoother transition for new users.

Distributing the collaboration better within the semester, potentially in week four and again in week eight of the fifteen-week term, could have improved student-participant perception and enjoyment of the activities. As I introduced the two collaborative activities in two consecutive weeks to assist with the speed of data collection, I felt the students, who perceived the activities to be difficult, felt the frustration for two back-to-back weeks without time to reflect on the benefit of the collaboration. Allowing time between collaboration will allow students to reflect on the activity and to use connections formed during collaboration as a resource.

In this action research study, I designed the collaborative activities to take the place of the weekly individual discussion posts. While I still find that having the students

construct discussion posts as a group with the chosen prompts to be effective, I found the one-week time for the activity might not be sufficient. If an instructor is to implement collaboration, especially in the online learning environment, they must provide enough time for students to communicate asynchronously to discuss the project, distribute the work, compile their information, and edit. The struggles students cited with communication, primarily waiting on other students to respond and struggling to distribute the workload may be attenuated by assigning the collaborative weeks to be two-week activities. This would give students time for planning and completing the activity with less pressure to produce a better outcome.

Group composition may also be a key target for improving the collaborative experience in future semesters. I found when I kept the groups consistent for the two consecutive weeks, the majority of the groups worked well, with all students participating in the activity. This was supported by 58% of students answering true or extremely true when asked if all of their group members contributed in a valuable way. However, this leaves 42% of students who did not feel the work distribution was equal, in fact, 27% answered not true or not at all true. Redistributing the groups after the first collaborative activity will lessen the inequity felt by certain students when their group members did not participate.

The implications of this study are that the method and parameters of the introduction of collaboration, its duration, and the composition of the groups all may be critical to success. My students were found to have levels of motivation higher than expected, and while some students enjoyed the collaboration and found they learned well

while collaborating, many did not. Focusing on the reported greatest challenges and attempting to attenuate them will be the guiding focus of developing an action plan.

Action Plan and Suggestions for future research

Mertler (2014) includes the development of an action plan in the developing stage of the action research process. Due to the cyclic nature of action research, the action plan is the result of a first round of collecting data and is intended to put into action what is discovered through data collection and analysis. Mertler states that the developing stage "Consists primarily of taking the results of your data analysis, your interpretations of those results, and the final conclusions drawn from the interpretations and formulating a plan of action for the future" (2014, p. 210). The following section will summarize my plan for collaboration in future semesters of online BIO 101.

I start by stating I still suspect that collaboration has power as a social constructivist strategy in online classes to connect students socially with each other, fostering a community of learners. Rovai states, "Strong feelings of community increase the flow of information among all learners, the availability of support, commitment to group goals, cooperation among members, and satisfaction with group efforts" (2001, p. 33). While I did not see a significant change in motivation as measured by the MSLQ in this study, I believe I can still utilize collaboration to motivate my students. My action plan includes implementing collaboration in another semester of Bio 101, fall 2019, with changes to the introduction, duration, timing, and composition of groups, all of which were reported challenges in this action research study.

I plan to introduce collaboration using the same technological tools, Google Docs and the D2L discussion Forums, but allowing two weeks for group collaboration for each

activity. I will also redistribute the two activities to weeks 4-6 and 8-10 of the fifteen-week semester. Additionally, when the collaboration is introduced I will post a training video for Google Docs, showing the students around the most important features of the platform. This video will show the students how to use the chat feature to promote communication between group members lessening their frustration in that area.

I plan to change the composition of the groups after the first collaborative activity. I am considering a focused redistribution to ensure that no group contains two individuals who did not participate during the first round. Additionally, using groups with four participants and not three, as I did this time, will lessen the influence of one student not participating on the remaining group members.

This trial of collaboration will focus on alleviating the challenges perceived by my student-participants in this action research study. By doing this, I hope students will enjoy the collaboration more, find it beneficial to their learning, and feel less isolated in the online class than they did previously.

What was surprising to me in evaluating the data collected through this action research study was my student's baseline level of motivation being higher than I anticipated. Additionally, they appreciate being challenged by course work, especially if it taps into their native curiosity. The value that students place on grades in courses cannot be underestimated and placing too much grade value on coursework involving collaboration may produce negative outcomes.

To investigate baseline motivation levels further, I would also like to propose a new research question. Are students registering for an online BIO 101 course at a technical college more motivated than students who register for the course in the

traditional format? I would like to look for correlations in student age, gender, and experience in science courses online with their motivation as measured by the MSLQ at the end of the semester.

I suspect the students attempting science courses online include a population of highly motivated students, who despite being aware of the challenges of online science courses are motivated. I expect the higher attrition rates seen in our online courses are due to students who are not prepared for taking a science course online dropping or withdrawing from the course when they realize the level of difficulty. When only looking at the students who persist and do not drop or withdraw, by giving the MSLQ posttest at the end of the semester, I expect online students may show higher motivation levels.

Description of the Action Researcher as a Curriculum Leader

In my current position at BTC, my role as a curriculum leader is two-fold, within the classroom as a faculty member and at the department level as the Department Chair of the Natural & Physical Sciences Department. As a two-year technical college that has served two counties in Northeastern South Carolina for over 50 years, BTC is a critical source of education and training for our community. Community and technical colleges account for over 45% of the US undergraduate population (Martin, Galentino, & Townsend, 2014). "Educating this large diverse demographic is fundamental to creating an active and engaged citizenry, providing workers with the tools necessary in the new global economy, and maintaining a strong middle class" (Martin, Galentino, & Townsend, 2014, pp. 221-222). I find myself uniquely situated to make a difference in

my student's lives and in the curriculum of the college as a curriculum leader, and my roles as a leader has shifted and grown through this action research cycle.

As a Department Chair, my task is to lead a department within a public organization, which like many others, is in a state of pressure due to lowered enrollment, while also moving through the stages of the accreditation processes. The institution is dynamic, in an ever-changing state, due to new pedagogical initiatives, technological advancements and administrative changes. Brubaker (2004) defines the creative curriculum leader as attentive to the inner curriculum, which is "what one experiences as learning settings is cooperatively created" (p. 21). My goal is to become a creative curriculum leader, unafraid of new strategies and initiatives and ever focused on the shared vision of our institution.

In my role as Chair, I am still in the classroom teaching two to three sections a semester, and the course that is the focus of this study, Bio 101, is the course I primarily teach. The teacher's role as a curriculum leader is multi-faceted, to serve the students in their classroom by doing their best to enable them to learn the material, laying the groundwork for a future career or educational endeavor, and to serve the institution as well as their fellow teachers. "Teachers need leadership skills to motivate students and colleagues, communicate with and influence parents, identify and use human and non-human resources, and deal effectively with education issues and challenges" (Brubaker, 2004, p. 150). I employ my philosophy of leadership including open communication, trust, flexibility and a shared vision of student-centered curriculum in the classroom with my students.

My goal is to have the students I teach value my role as their leader through the implementation of a leadership style promoting the building of relationships and fostering the development of a learning community of motivated students. Motivating my students is key, and the power of a motivation is undeniable, I plan to continue to target motivation as a lever to help my students succeed. At the conclusion of this study, I know my online technical college students are motivated, and if I can improve their motivation through creative instruction, I can serve to improve their success and retention.

Within the department, I prioritize collaborative leadership, allowing others to serve in leadership roles as frequently as possible. Staub states, "highly effective leadership requires the leader to have the capacity to follow" (2013, p. 86). This style of leadership provides the setting where others can practice leadership. Brubaker (2004) says, "The creative leader helps to create the conditions whereby others become their own leaders" (pp. 80-81). I strive to develop faculty into curriculum leaders, something that will serve to improve our college and will benefit our students.

The problem of practice I investigated in this action research study is an institutional, as well as, a classroom problem at BTC. The college as a whole is experiencing higher attrition rates in online and hybrid sections. This problem is not isolated to BTC; many other colleges and universities are experiencing the same increase in enrollment in online courses matched with decreased student success and higher attrition rates (Garman & Good, 2012).

This research looked at a creative curriculum solution with the potential to affect these rates, and while no change in motivation was seen in this short study, I am not

convinced collaboration is not an effective tool to motivate and connect online students socially. Donaldson and Bucy (2016) posit key indicators of success in the modern age of digital learning are engagement and motivation, and I will continue to strive to motivate my online students.

This research has changed me as a curriculum leader; I have been able to revitalize my role as a researcher, something I have not done since earning my graduate degree in science. Additionally, I have learned the process of action research is truly cyclic. I have completed a cycle that did not produce the result I sought; now, I will adjust and reimagine how this could be improved to begin another cycle. If successful, this will be another tool in the creative curriculum toolbox for faculty at this institution to utilize to improve the success and retention of our online students.

Limitations of this Action Research Study

A limitation of this study was the small sample size of students utilized for data collection, 26 student-participants, and the inability to assign student-participants randomly to sections. There were only two sections of BIO 101 running in the hybrid format in the semester of data collection, spring 2019; therefore, these two sections were utilized. Although almost all students consented to participate, some withdrew during the study, and others were absent for their lab session when either the pretest or posttest was administered, reducing the population to be utilized for collection.

A second potential weakness was the short duration of data collection. To complete data collection and analysis within the eight-week period prescribed, the study included two consecutive weeks of collaboration early in the fifteen-week term, weeks four and five. As discussed in the action plan, I will adjust the duration as well as the

distribution of these collaborative activities to be longer and spaced better within the semester in a future semester of data collection.

Despite the strong construct validity provided by using a well-established tool, the MSLQ, spacing the pretest and posttest so closely together within three weeks of each other (week three and week six) could have led to the threat of repeated testing. The threat of repeated testing indicates students are sensitized to the questions, already seeing them previously and therefore their answers are biased.

Additionally, because students knew they were participating in a research study, the opportunity for student-participants to provide biased answers is always a threat. Students were informed their participation was voluntary and they were told their MSLQ submissions only contained their randomly assigned number and the student-perception questionnaire was completely anonymous. Therefore, no negative reflection on the student could occur based on the answers they provided during data collection.

While actions were taken to prevent this, researcher bias is a concern in any research study. In this particular study, I graded the individual and collaborative discussion posts submitted by the student-participants at the end of each submission week, prior to any data analysis, in an effort to separate grading from data analysis. At the conclusion of week 5, when all grades were entered into the D2L gradebook for individual and collaborative posts, I then exported the grades to excel for analysis. Additionally, as I grade in D2L, I move from one student to the next in the grade book, evaluating submissions without noting student names, only after all submissions are graded through the rubric attached to the grade item, do I review the grades by student

name. While not a completely effective method to prevent grading bias, it does restrict the opportunity for it.

Finally, it should be noted, a history threat was present during the data collection period. The region that BTC is located in was impacted severely in fall of 2018 by a natural disaster, resulting in a three-week closure of the college campus. This was the longest closure in the history of the institution. Many students, faculty, and staff were affected, suffering damage to their homes and even some losing their homes during the subsequent flooding that occurred after the storm. My initial intention was to collect data in fall of 2019, a plan derailed by the storm. Many in our area are still recovering from the tragedy experienced here, and I am suspicious the impacts of the natural disaster still being felt may have altered my student's attitudes or behaviors. It is unclear what affect may have been present, but it is worth noting as a potential source of error.

Conclusion

The purpose of this action research study was to investigate potential instructional strategies to attenuate the lower success and higher withdrawal rates we are seeing in online courses at BTC, specifically my online BIO 101 course. Demand has increased for online course offerings in higher education, with BTC reporting a 156% increase in offered online courses in recent years. As the demand for online courses grows, it is important to explore best practices in instructional delivery for distance learning that will ensure equal success and promote retention.

Rovai reports, "The research literature…provides evidence of feelings of isolation, distraction, and hindered social development among distance education students" (2001, p. 33). This isolation was thought to be a contributing factor in online

student success and retention and as such, I focused my intervention strategy on lessening isolation of learners in my online classes by investigating strategies to connect the students.

Collaboration, an instructional strategy grounded in social constructivism, was identified as a potential target to breach the isolation barrier felt by many online students. Due to its correlation with student persistence and success, motivation was chosen as the dependent variable of the introduction of collaboration. Motivation was measured through administration of the MSLQ, student-participant perception of collaboration was measured through a questionnaire, and achievement on individually constructed and collaboratively constructed discussion posts were compared utilizing assignment grades.

Although there was no significant change in student-participant motivation after the introduction of collaborative activities, I remain convinced this strategy has the potential to influence my online student's motivation positively. Highly motivated students, especially those intrinsically motivated, will persist in a class, achieve greater academic success, are known to have greater self-efficacy and lower anxiety, and place greater value on education (Bolkan, 2015; Dagnew, 21017; Gottfried, 1985; Ryan & Deci, 2000; Weber, 2003). I will continue to investigate strategies with the potential to elevate motivation of students in my online classes, thereby bettering the curriculum of instruction within my course, in the department and at the college level.

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APPENDIX A: INFORMED CONSENT FORM

Principal Investigator (PI): Christina Fieber, MS
Phone: 843-477-2071
Office Location: Building 200GS Rm 156A
Project Title: The Effect of Collaboration on Online Student Motivation in a College Biology Course

Hello,
You are invited to participate with no obligation in a research study that has a primary goal of understanding what instructional strategies motivate students in online learning environments. Specifically, this study will assess whether or not collaboration in the online course environment has an impact on student motivation.

If you choose to participate in the study, you will complete a MSLQ: Motivated Strategies for Learning Questionnaire (brief questionnaire that takes about 10 minutes to complete) that will be administered in the lab portion of the course. After participating in a collaborative learning activity in the online lecture, you will then repeat the MSLQ in a subsequent lab session. You will also complete a very short survey assessing your perception of collaborative work in online classes. I will also collect grades on independent and collaborative discussion posts for comparison.

All information obtained will be anonymous; no names will be utilized on surveys, or associated with collected grades. All student participants will randomly be assigned an identification number and this number will be utilized. The purpose of number assignment is to ensure that if requested, the PI can provide students with results on their MSLQ submissions at the conclusion of the project. All collected data will be confidential, protected, and only reported as statistical analyses.

Your decision to participate in this research project will not affect your grade in this course in any way and will not require any extra time from you; the surveys will be administered during your required lab sessions. If you choose not to participate, you will still be required to do graded activities in the course, but will not participate in the surveys. You may choose to withdraw from the study at any time and the PI may choose to remove you from the study.

If you have any questions, please use the phone number above or the email Christina.fieber@hgtc.edu to contact the PI and have your questions answered prior to signing this form.

Your agreement to participate will involve the submission of MSLQ surveys and a perception survey administered in lab as well as the collection of grades on individual and collaboratively constructed discussion posts. Your signature below indicates that you are over the age of 18.

I **AGREE** **DO NOT AGREE** (circle one) to participate in this research study.

Participant's Name (please print):_____ Date: _____

Participant's Signature: _____
_____

APPENDIX B: PARENTAL CONSENT FORM

Principal Investigator (PI): Christina Fieber, MS
Phone: 843-477-2071
Office Location: Building 200GS Rm 156A
Project Title: The Effect of Collaboration on Online Student Motivation in a College Biology Course

Dear Parent,
Your child has been invited to participate with no obligation in a research study that has a primary goal of understanding what instructional strategies motivate students in online learning environments. Specifically, this study will assess whether or not collaboration in the online course environment has an impact on student motivation.

If you choose to allow your child to participate in the study, they will complete a MSLQ: Motivated Strategies for Learning Questionnaire (brief questionnaire that takes about 10 minutes to complete) that will be administered in the lab portion of the course. After participating in a collaborative learning activity in the online lecture, they will then repeat the MSLQ in a subsequent lab session. They will also complete a very short survey assessing their perception of collaborative work in online classes. I will collect grades on independent and collaborative discussion posts for comparison.

All information obtained will be anonymous; no names will be utilized on surveys, or associated with collected grades. All student participants will randomly be assigned an identification number and this number will be utilized. The purpose of number assignment is to ensure that if requested, the PI can provide students with results on their MSLQ submissions at the conclusion of the project. All collected data will be confidential, protected, and only reported as statistical analyses.

Your decision to allow your child participate in this research project will not affect their grade in this course in any way and will not require any extra time from your child, the surveys will be administered during required lab sessions. If you choose not to allow their participation, your child will still be required to do graded activities in the course, but will not participate in the surveys. You may choose to withdraw your child from the study at any time and the PI may choose to remove your child from the study.

If you have any questions, please use the phone number above or the email Christina.fieber@hgtc.edu to contact the PI and have your questions answered prior to signing this form.

Sincerely,
Christina Fieber
Academic Chair & Professor, Department of Natural & Physical Sciences

Your signature below indicates that you give consent for your child to participate in the above-referenced research study.

Parent's Name (please print): _____
Child's Name: _____
Parent's Signature: _____

APPENDIX C: ASSENT FORM FOR MINOR STUDENT- PARTICIPANTS

Principal Investigator (PI): Christina Fieber, MS
Phone: 843-477-2071
Office Location: Building 200GS Rm 156A
Project Title: The Effect of Collaboration on Online Student Motivation in a College Biology Course

Hello,
You are invited to participate with no obligation in a research study that has a primary goal of understanding what instructional strategies motivate students in online learning environments. Specifically, this study will assess whether or not collaboration in the online course environment has an impact on student motivation.

If you choose to participate in the study, you will complete a MSLQ: Motivated Strategies for Learning Questionnaire (brief questionnaire that takes about 10 minutes to complete) that will be administered in the lab portion of the course. After participating in a collaborative learning activity in the online lecture, you will then repeat the MSLQ in a subsequent lab session. You will also complete a very short survey assessing your perception of collaborative work in online classes. I will also collect grades on independent and collaborative discussion posts for comparison.

All information obtained will be anonymous; no names will be utilized on surveys, or associated with collected grades. All student participants will randomly be assigned an identification number and this number will be utilized. The purpose of number assignment is to ensure that if requested, the PI can provide students with results on their MSLQ submissions at the conclusion of the project. All collected data will be confidential, protected, and only reported as statistical analyses.

Your decision to participate in this research project will not affect your grade in this course in any way and will not require any extra time from you; the surveys will be administered during your required lab sessions. If you choose not to participate, you will still be required to do graded activities in the course, but will not participate in the surveys. You may choose to withdraw from the study at any time and the PI may choose to remove you from the study.

If you have any questions, please use the phone number above or the email Christina.fieber@hgtc.edu to contact the PI and have your questions answered prior to signing this form.

Your agreement to participate will involve the submission of MSLQ surveys and a perception survey administered in lab as well as the collection of grades on individual and collaboratively constructed discussion posts.

Sincerely,
Christina Fieber
Academic Chair & Professor, Department of Natural & Physical Sciences

_____YES I agree to participate; I understand the study will be done during class time.	_____ NO I do not want to participate in the study.

APPENDIX D: MOTIVATED STRATEGIES FOR LEARNING QUESTIONNAIRE

(MSLQ)

The following questions ask about your motivation for and attitudes about this class. Remember there are no right or wrong answers, just answer as accurately as possible. Use the scale below to answer the questions. If you think the statement is very true of you, answer 7; if a statement is not at all true of you, answer 1. If the statement is more or less true of you, circle the number between 1 and 7 that best describes you.

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

1. In a class like this, I prefer course material that really challenges me so I can learn new things.	1	2	3	4	5	6	7
2. If I study in appropriate ways, then I will be able to learn the material in this course.	1	2	3	4	5	6	7
3. When I take a test I think about how poorly I am doing compared with other students.	1	2	3	4	5	6	7
4. I think I will be able to use what I learn in this course in other courses.	1	2	3	4	5	6	7
5. I believe I will receive an excellent grade in this class.	1	2	3	4	5	6	7
6. I'm certain I can understand the most difficult material presented in the readings for this course.	1	2	3	4	5	6	7
7. Getting a good grade in this class is the most satisfying thing for me right now.	1	2	3	4	5	6	7
8. When I take a test I think about items on other parts of the test I can't answer.	1	2	3	4	5	6	7
9. It is my own fault if I don't learn the material in this course.	1	2	3	4	5	6	7
10. It is important for me to learn the course material in this class.	1	2	3	4	5	6	7

11. The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade.	1 2 3 4 5 6 7
12. I'm confident I can learn the basic concepts taught in this course.	1 2 3 4 5 6 7
13. If I can, I want to get better grades in this class than most of the other students.	1 2 3 4 5 6 7
14. When I take tests I think of the consequences of failing.	1 2 3 4 5 6 7
15. I'm confident I can understand the most complex material presented by the instructor in this course.	1 2 3 4 5 6 7
16. In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.	1 2 3 4 5 6 7
17. I am very interested in the content area of this course.	1 2 3 4 5 6 7
18. If I try hard enough, then I will understand the course material.	1 2 3 4 5 6 7
19. I have an uneasy, upset feeling when I take an exam.	1 2 3 4 5 6 7
20. I'm confident I can do an excellent job on the assignments and tests in this course.	1 2 3 4 5 6 7
21. I expect to do well in this class.	1 2 3 4 5 6 7
22. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.	1 2 3 4 5 6 7
23. I think the course material in this class is useful for me to learn.	1 2 3 4 5 6 7
24. When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good grade.	1 2 3 4 5 6 7
25. If I don't understand the course material, it is because I didn't try hard enough.	1 2 3 4 5 6 7
26. I like the subject matter of this course.	1 2 3 4 5 6 7
27. Understanding the subject matter of this course is very important to me.	1 2 3 4 5 6 7
28. I feel my heart beating fast when I take an exam.	1 2 3 4 5 6 7
29. I'm certain I can master the skills being taught in this class.	1 2 3 4 5 6 7

30. I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.	1	2	3	4	5	6	7
31. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.	1	2	3	4	5	6	7

APPENDIX E: MSLQ STUDENT FEEDBACK FORM

Earlier this semester you took a questionnaire called the Motivated Strategies for Learning Questionnaire (MSLQ). The purpose of this questionnaire was to gather some information about your motivation for schoolwork. As promised, I am providing you with feedback from the MSLQ on your study motivation. This handout describes how to interpret your scores, so you can figure out what the scores mean.

This feedback is intended to help you determine your own strengths and weaknesses as a student. It has been shown that students like to have information on how other students do on the MSLQ. Therefore, I have included information about the average levels of motivation for the students in your class. Your class as a whole may be generally high in some areas and low in others, so think about your own motivation rather than about comparisons with others.

You may want to use this feedback to do something about changing your motivation. All of the motivational skills mentioned on your feedback sheet are learnable. This is an important idea to remember, especially in college. You can decide whether you want to change these aspects of your learning style. I have provided some hints to go along with this feedback. I hope you find these suggestions helpful. Keep mind that these are not the only ways to improve, you may want to seek additional help from services available at this institution.

Interpreting Your Scores

All the scales are based on a seven-point scale. Although some items were worded negatively, I have reversed these questions so that in general, a higher score such as a 4, 5, 6, or 7 is better than a lower score like a 1, 2, or 3. The only exception is the test anxiety scale, where a high score means more worrying.

The average score for your class, as well as the breakdown of the scores for the bottom 25%, middle 50%, and the top 25%, is provided for each scale. If your score is at the bottom 25% on a scale, this means that most of the students in your class are reporting more motivation. If your score is in the middle 50%, then you are similar to most students. If your score is in the top 25%, then you think you are more motivated than other students. In general, if your scores are above 3, then you are doing well. If you are below 3 on most of the scales, you may want to seek help from your instructor or the counseling services at your institution.

Motivation Scales

The first three scales referred to your motivation for the course, confidence in doing well in school, and your anxiety about taking tests.

I. Motivation: Interest

This is a measure of how interested you are in the material being covered in this course. A high score means you like the subject matter and are very interested in the content area of this class.

Your score: _____
Class mean: _____
Bottom 25%: _____
Middle 50%: _____
Top 25%: _____

Suggestions: Skim the table of contents of the class textbook or take a look at the course syllabus and make a list of the three topics that most interest you and of the three topics that least interest you. Pay particular attention to these topics. What is it about the three most interesting topics that makes you like them so-much? What is it about the other three topics that makes them uninteresting? Can you find any of the characteristics of the three most interesting topics in the three least interesting topics? If you identify what itis about the three most interesting topics that makes you like them so much, you may be able to apply what you found to the three least interesting ones, and perhaps you'll find that those uninteresting topics aren't so uninteresting after all!

II. Motivation: Expectancy for Success

This is a measure of your perceptions of your potential success in this course and of your self-confidence for understanding the course content. A high score means that you think you will do well in the course, and feel confident that you will be able to master the course material.

Your score: _____
Class mean: _____
Bottom 25%: _____
Middle 50%: _____
Top 25%: _____

Suggestions: Evaluate your current approach to a course assignment from different points of view. For example, describe the effectiveness and ineffectiveness of your own approach from your own perspective. Then imagine how a classmate might evaluate your approach. By analyzing the way you are tackling an assignment, you may be able to figure out what you're doing right and what you're doing wrong and can change your approach. A better

understanding of the way you learn, what works and what doesn't work, may help increase your confidence in doing well in this course.

III. Test Anxiety

This is a measure of how much you worry about tests and how often you have distracting thoughts when you take an exam. In contrast to the other scales, a high score here means that you are anxious in testing situations.

Your score: _____
Class mean: _____
Bottom 25%: _____
Middle 50%: _____
Top 25%: _____

Suggestions: Developing better study skills usually results in less anxiety. Prepare well for class and try to complete assignments on time. Try not to wait until the last minute to get things done or to get ready for an exam. Doing this should help build your confidence at test time and hopefully reduce test anxiety. When taking a test, concentrate on one item at a time, and if you're stumped on a question, move on and go back to the question later. Remind yourself that you've prepared well and if you can't answer some questions, it's ok, you'll still be able to answer the others.

APPENDIX F: STUDENT PERCEPTION QUESTIONNAIRE

The purpose of this questionnaire is to provide valuable information to enable your professor to improve teaching practices. Your responses will be anonymous, so please do not place your name anywhere. Please carefully consider each statement or question and answer as honestly as possible. The first questions address previous online courses you have taken, circle yes or no. Next, there are statements describing collaboration in courses. Please select the number that most accurately describes how strongly you agree with each statement and write it in the blank. The last items are open-ended allowing you to provide responses that are more detailed.

Have you taken online courses previously that used collaborative activities? Yes No

If so, did you find these collaborative activities beneficial to learning? Yes No

If so, did you find these collaborative activities enjoyable? Yes No

---

1	2	3	4	5
Not at all True				**Extremely True**

1. _____ I found I learned well when constructing discussion posts as a group.
2. _____ I was concerned about my grade being affected by my classmates in the group activities.
3. _____ I enjoyed working with a group to complete discussion posts.
4. _____ I signed up for online coursework anticipating I would not have to work with classmates.
5. _____ I found it easy to communicate with my classmates to construct the group discussion posts.
6. _____ I prefer to work alone.
7. _____ All of my group members contributed in a valuable way to the discussion post.
8. _____ GoogleDocs was a good tool for group work in an online class.
9. _____ Completing discussion posts as a group was more difficult than working alone.
10. _____ I would like to have collaborative activities in other online courses.

1. What were the greatest challenges with working collaboratively in an online course? _____
_____
_____

2. What are the advantages to working collaboratively in a group? _____
_____
_____
_____

3. Are there any improvements you could suggest to collaborative activities for future sections of this course? _____
_____
_____

APPENDIX G: INDIVIDUAL AND COLLABORATIVE DISCUSSION POST RUBRICS

Rubric for Individual Discussion Board Posts

Criteria	Excellent 80 points	Above Average 70 points	Below Average 55 points	Unacceptable 40 points
Initial Post	The student's post answers the discussion question fully and accurately using information from course content or outside sources. The student constructed a post that is more than 6 thorough sentences, is grammatically correct with proper punctuation and spelling. The post was submitted by Thursday at 11:59PM	The student's post answers the discussion question using information from course content or outside sources, but does not meet **one** of the following criteria: -answers the question fully and accurately -uses correct grammar, spelling and punctuation -meets the minimum length of 6 through sentences -is posted by Thursday at 11:59pm	The student's post answers the discussion question using information from course content or outside sources, but does not meet **two** of the following criteria: -answers the question fully and accurately -uses correct grammar, spelling and punctuation -meets the minimum length of 6 through sentences -is posted by Thursday at 11:59pm	The student's post answers the discussion question using information from course content or outside sources, but does not meet **three** of the following criteria: -answers the question fully and accurately -uses correct grammar, spelling and punctuation -meets the minimum length of 6 through sentences -is posted by Thursday at 11:59pm
Replies	Excellent 20 points	Above Average 14 points	Average 10 points	No Replies 0 points
Replies to Cassmates	The student replied to a minimum of 2 classmate's posts. The replies served to deepen the academic discussion on the discussion board and were insightful. The replies used proper grammar, punctuation and spelling.	The student replied to a minimum of 2 classmate's posts. The replies did not do **one** of the following: -deepen the academic discussion on the discussion board by being insightful -use proper grammar, punctuation and spelling.	The student either only replied to one classmate with a reply that was insightful using correct grammar, punctuation and spelling **OR** the student replied to two classmate's but neither reply was both academically insightful and used correct grammar, punctuation and spelling.	The student did not reply to a classmate on this week's discussion board.
Overall Score	Level 4 85 or more	Level 3 66 or more	Level 2 41 or more	Level 1 0 or more

Rubric for Collaborative Discussion Board Posts

Criteria	Excellent 60 points	Above Average 50 points	Below Average 40 points	Unacceptable 30 points
Group Post	The group's post answers the discussion question fully and accurately using information from course content or outside sources. The group constructed a thorough post that is grammatically correct with proper punctuation and spelling. The post was submitted by Saturday at 11:59PM	The group's post answers the discussion question fully and accurately using information from course content or outside sources, but does not meet **one** of the following criteria: -answers the question fully and accurately -uses correct grammar, spelling and punctuation -is thorough -is posted by Saturday at 11:59pm	The group's post answers the discussion question fully and accurately using information from course content or outside sources, but does not meet **two** of the following criteria: -answers the question fully and accurately -uses correct grammar, spelling and punctuation -is thorough -is posted by Saturday at 11:59pm	The group's post answers the discussion question fully and accurately using information from course content or outside sources, but does not meet **three** of the following criteria: -answers the question fully and accurately -uses correct grammar, spelling and punctuation -is thorough -is posted by Saturday at 11:59pm
Replies	Excellent 20 points	Above Average 14 points	Average 10 points	No Replies 0 points
Replies to Cassmates	The student replied to a minimum of 2 classmate's posts. The replies served to deepen the academic discussion on the discussion board and were insightful. The replies used proper grammar, punctuation and spelling.	The student replied to a minimum of 2 classmate's posts. The replies did not do **one** of the following: -deepen the academic discussion on the discussion board by being insightful -use proper grammar, punctuation and spelling.	The student either only replied to one classmate with a reply that was insightful using correct grammar, punctuation and spelling **OR** the student replied to two classmate's but neither reply was both academically insightful and used correct grammar, punctuation and spelling.	The student did not reply to a classmate on this week's discussion board.
Peer Evaluation	Excellent 20 points	Above Average 15 points	Below Average 10 points	Unacceptable 0 points
Peer Evaluation	Student scores 14-16 on the peer evaluation form.	Student scores 11-13 on the peer evaluation form.	Student scores 9-10 on the peer evaluation form.	Student scores 8 or below on the peer evaluation form.
Overall Score	Level 4 85 or more	Level 3 66 or more	Level 2 41 or more	Level 1 0 or more

APPENDIX H: PEER EVALUATION GRADING FORM

Peer Evaluation of Group Members

Please grade the participation and level of contribution of your group members with this form. For each person, indicate the extent to which you agree with the statement on the left, using a scale of 1-4 (1=strongly disagree; 2=disagree; 3=agree; 4=strongly agree). Total the numbers in each column.

Evaluation Criteria	**Group member:**	**Group member:**	**Group member:**
Demonstrates a cooperative and supportive attitude.			
Contributes meaningfully to group discussions posts.			
Completes assignments on time.			
Prepares quality work.			
(16 maximum)Total:			

APPENDIX I: INDIVIDUAL AND COLLABORATIVE DISCUSSION FORUMS

Individual Post Forum Instructions

Weekly Discussion Posts

You will be required to submit discussion posts for each week in this course. There are 14 weeks total. This will serve as your attendance in the course AND will contribute to 7.5% of your final grade. Every week you must post and then reply to at least 2 classmates. If you do not post, you will be marked absent, after 2 absences I will withdraw you from the course.

To compose your post, read the discussion question for the week. The questions will vary from specific topics or concepts, current events, and even creative or opinion questions. Your answer to the question should be **grammatically correct**, utilize **correct spelling** and **punctuation**. For each question reply, I want a **minimum of 6 thorough sentences**! Answers to discussion questions must be original work and cannot be taken from another student or directly copied from the textbook. To prevent this, this will be a post first board, you will have to post to see your classmate's replies to the question. If a source other than the textbook is used, please cite it. Otherwise, it will be considered plagiarism and will receive a grade of zero.

Once you have posted your response to the question, you are required to reply to at least 2 of your classmate's posts. This can be offering your opinion on their answer, providing an alternative viewpoint or even asking a question of them based on their reply. Be polite, and be thoughtful. A comment like "John I really liked your post" does nothing to further the academic conversation and will not count! If a classmate asks you questions, please reply.

Here are a few links that can help you formulate good posts & replies:

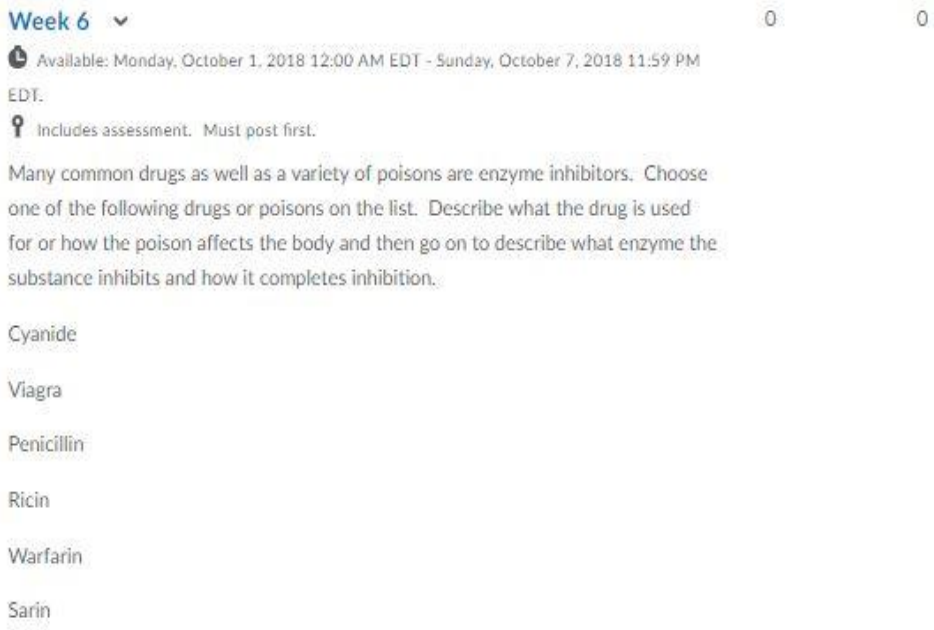
How to Write Discussion Posts in 7 Easy Steps

Tips for Writing Thoughtful Discussion Responses

Due Dates: Weeks run Monday to Sunday. Main posts are due by Thursday at 11:59pm, replies are due by Sunday at 11:59pm

Grading: Main Post 80% Reply 1-10%, Reply 2-10%

Individual Post Example



Week 6 0 0

Available: Monday, October 1, 2018 12:00 AM EDT - Sunday, October 7, 2018 11:59 PM EDT.

Includes assessment. Must post first.

Many common drugs as well as a variety of poisons are enzyme inhibitors. Choose one of the following drugs or poisons on the list. Describe what the drug is used for or how the poison affects the body and then go on to describe what enzyme the substance inhibits and how it completes inhibition.

Cyanide

Viagra

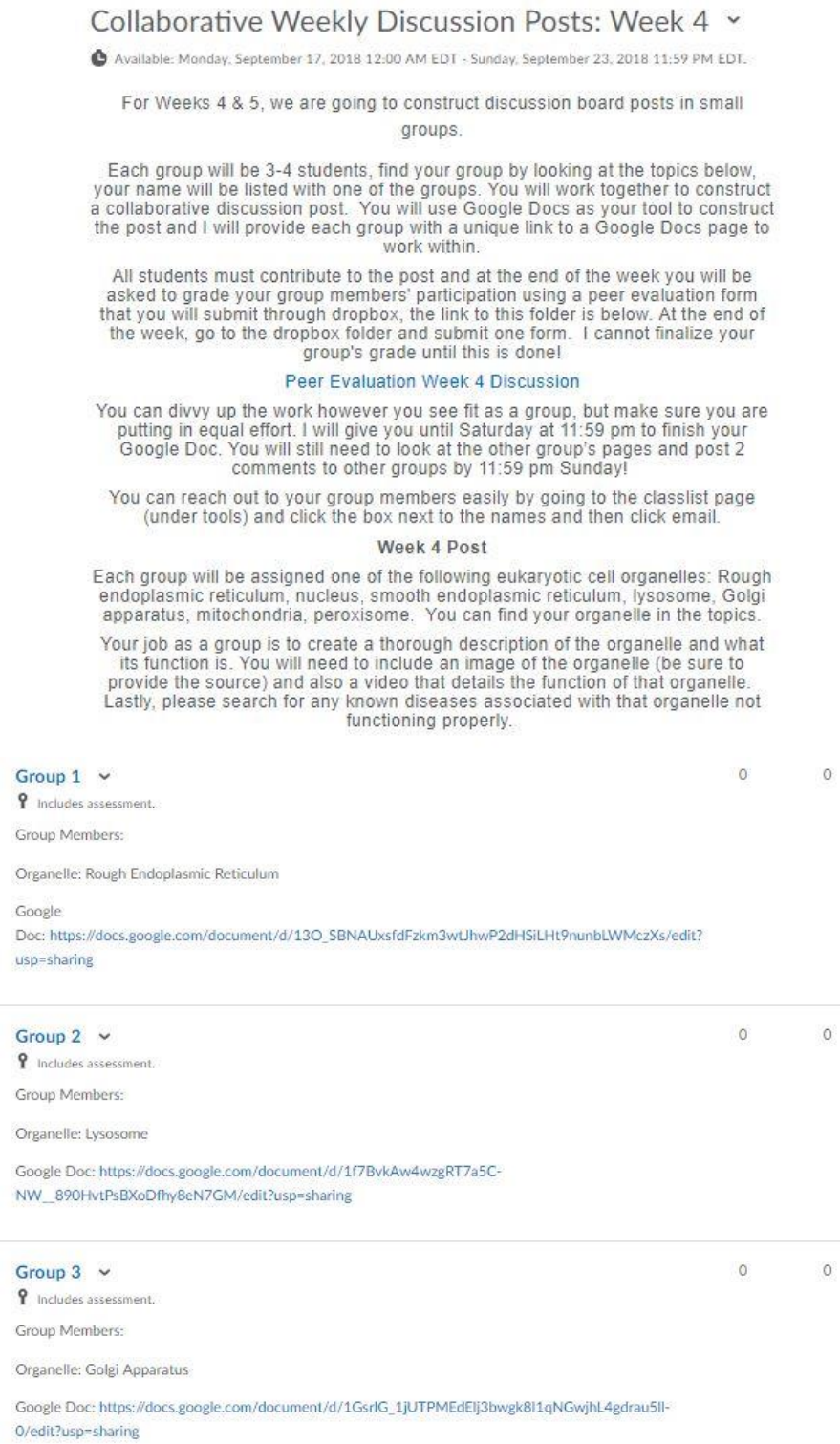
Penicillin

Ricin

Warfarin

Sarin

Collaborative Post Forum Instructions & Example



Collaborative Weekly Discussion Posts: Week 4

Available: Monday, September 17, 2018 12:00 AM EDT - Sunday, September 23, 2018 11:59 PM EDT.

For Weeks 4 & 5, we are going to construct discussion board posts in small groups.

Each group will be 3-4 students, find your group by looking at the topics below, your name will be listed with one of the groups. You will work together to construct a collaborative discussion post. You will use Google Docs as your tool to construct the post and I will provide each group with a unique link to a Google Docs page to work within.

All students must contribute to the post and at the end of the week you will be asked to grade your group members' participation using a peer evaluation form that you will submit through dropbox, the link to this folder is below. At the end of the week, go to the dropbox folder and submit one form. I cannot finalize your group's grade until this is done!

Peer Evaluation Week 4 Discussion

You can divvy up the work however you see fit as a group, but make sure you are putting in equal effort. I will give you until Saturday at 11:59 pm to finish your Google Doc. You will still need to look at the other group's pages and post 2 comments to other groups by 11:59 pm Sunday!

You can reach out to your group members easily by going to the classlist page (under tools) and click the box next to the names and then click email.

Week 4 Post

Each group will be assigned one of the following eukaryotic cell organelles: Rough endoplasmic reticulum, nucleus, smooth endoplasmic reticulum, lysosome, Golgi apparatus, mitochondria, peroxisome. You can find your organelle in the topics.

Your job as a group is to create a thorough description of the organelle and what its function is. You will need to include an image of the organelle (be sure to provide the source) and also a video that details the function of that organelle. Lastly, please search for any known diseases associated with that organelle not functioning properly.

Group 1 0 0

Includes assessment.

Group Members:

Organelle: Rough Endoplasmic Reticulum

Google Doc: https://docs.google.com/document/d/13O_SBNAUxsfdFzkm3wtJhwP2dHSiLHt9nunbLWMczXs/edit?usp=sharing

Group 2 0 0

Includes assessment.

Group Members:

Organelle: Lysosome

Google Doc: https://docs.google.com/document/d/1f7BvkAw4wzgRT7a5C-NW__890HvtPsBXoDfhy8eN7GM/edit?usp=sharing

Group 3 0 0

Includes assessment.

Group Members:

Organelle: Golgi Apparatus

Google Doc: https://docs.google.com/document/d/1GsrIG_1jUTPMEdElj3bwgk8l1qNGwjhL4gdrau5ll-0/edit?usp=sharing