

THE EFFECTS OF FORMATIVE AND SUMMATIVE ASSESSMENT ON
STUDENT'S CONNECTEDNESS, SATISFACTION, LEARNING AND ACADEMIC
PERFORMANCE WITHIN AN ONLINE HEALTHCARE COURSE

by

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The following individuals read and discussed the dissertation submitted by student Thomas J. Wing, and they evaluated his presentation and response to questions during the final oral examination. They found that the student passed the final oral examination.

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DEDICATION

For my son Cooper Thomas Wing, I dedicate this dissertation to you, anything is possible.

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I would like to say thank you and acknowledge all of those individuals who supported me during this journey.

ABSTRACT

The quantitative study presented here evaluates the effects of formative and summative assessment on student's connectedness, satisfaction, learning and academic performance within a university three-credit 400 level online healthcare course. Literature exploring the role that formative assessment plays within an online environment is currently lacking. Additionally, understanding how assessment practices can help support the goals of online healthcare education is vitally important given the rise in popularity of this delivery format.

This study investigated student outcomes in the form of connectedness, satisfaction, learning and academic performance. Four cohorts of students were included in this study. Two cohorts were provided with formative assessment procedures while the other two cohorts were provided with primarily summative assessment. A survey-based tool was created and delivered to students' post-course completion which gathered information on a students' sense of connectedness, satisfaction, and learning, whereas academic performance equated to final course grade earned.

A one-way ANOVA was performed utilizing SPSS to identify statistical differences between formative and summative assessment cohorts. Analysis results indicated that the formative cohorts were higher in all areas explored and statistically significantly higher in the areas of learning and academic performance. Additional discussion regarding the results as well as future research recommendations are provided at the conclusion of this quantitative study within chapter five.

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CHAPTER ONE: INTRODUCTION

Assessing student progress and attainment of learning objectives is an important part of any educational system (Hart, 2012). Authentically evaluating student learning within a healthcare education system that is predicated upon the awarding of potentially discriminatory quantitative grades has been a long-standing problem (Epstein, 2007; Rudolph, Simon, Raemer & Eppich, 2008). Assessment practices can be used to facilitate the advancement of educational pedagogical approaches when used appropriately for learners and educators to achieve learning objectives (Cauley & McMillan, 2010). A divide exists though in healthcare education with educators wanting to both rank students based upon summative scoring systems while at the same time use assessment methods which reflect achievement of synthesis of knowledge (Epstein, 2007). Unfortunately, the common practice of awarding summative scores to a student is not a “value-neutral” process and can have a detrimental impact on student anxiety, motivation and overall academic performance (Kohn, 2011).

The traditional approach to assessment of student learning is through the use of “summative” methods (Black & Wiliam, 2009). Summative assessment frequently employs the use of standardized exams, quizzes or assignments and subsequently provides quantitative scoring associated with a culminating grade (A, B, C, D, F) (Knight, 2002). Unfortunately, the common practice of awarding summative scores to a student is not a “value-neutral” process and can have a significant detrimental impact on student anxiety, motivation and overall academic performance (Kohn, 2011). Dissimilar

to summative assessment, “formative assessment” is performed to help students and educators identify knowledge gaps currently present and to make real-time changes in order to bridge said gaps (Nicol & Macfarlane-Dick, 2006).

A preponderance of studies concerning assessment have been conducted within the general education environment (O'Shaughnessy & Joyce, 2015). However, because of the unique characteristics of healthcare education and more specifically online healthcare education, it is necessary to study the effects of assessment within this environment. The problem is that a lack of information exists in how assessment methods should be used by online healthcare educators' to positively affect students and how best to improve upon those methods to ensure optimal student outcomes/performance (Epstein, 2007; Rudolph et al., 2008).

Online healthcare education courses and programs have been criticized for a lack of development of self-regulated lifelong learners, in addition to criticisms for low student persistence and low retention to graduation of students. In one frequently cited study researchers found that in comparison to face-to-face courses a similar online course had a six-fold increase in student dropout (Patterson & McFadden, 2009). The premise behind this study is that many of the issues that online healthcare education face (self-regulated learning, retention/persistence) are directly affected by specific student outcomes (connectedness, satisfaction, learning, academic performance) and that those student outcomes are heavily influenced by assessment practices deployed within a course of study. Therefore, assessment becomes a much greater tool than simply ranking students but rather a potential intervention which should be heavily invested in and emphasized as a solution to many of the problems facing online healthcare education.

Therefore, it is the aim of this study to investigate the impact assessment methodologies have on student outcomes such as student connectedness, learning, course satisfaction and academic performance, which have been previously linked to issues such as the development of self-regulated lifelong learners and persistence/retention (Broadbent & Poon, 2015; Clark, 2012; Lotkowski, Robbins & Noeth, 2004; Sembiring, 2015).

Characteristics of Online Healthcare Education

Healthcare education inherently lends itself to a traditionally summative approach to student assessment (i.e. A, B, C, D, F), with the ultimate outcome, a practitioner's credential, frequently viewed as pass-fail in nature (Rohe et al., 2006). A summative approach, or the assessment *of* learning, has been the foundation of many healthcare curricula; the thought being, this approach is easily standardized and provides clear outcome measurements (Epstein, 2007; Kohn, 2011). Summative assessments can be thought of as the 'destination' outcome. A student is deemed as 'having arrived' at the destination (e.g. successful completion of a task), but may have little knowledge about how they arrived at that destination. Students desiring a degree in a healthcare related field are commonly described as highly competitive and therefore often successful in achieving summative desired outcomes (e.g. the highest score, grade or rank) (Rohe et al., 2006). However, the problem this environment can create is often the development of competitive healthcare practitioners as opposed to collaborative healthcare practitioners (Leach, 2002; Rushton, 2005). As the landscape of healthcare in the United States transforms, there is an opportunity to evaluate the effectiveness of assessment practices utilized in traditional educational systems. In order to better prepare healthcare graduates a paradigm shift is needed, which necessitates an examination of assessment methods,

perhaps focused around one's' collaborative ability as a student; which ultimately fosters an effective clinician in a multidisciplinary setting (White & Fantone, 2010).

Formative assessment was defined by Black & Wiliam (2009) as follows “Practice in a classroom is formative to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers, to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have taken in the absence of the evidence that was elicited” (p.6). Although the above helps to further a conceptual understanding of formative assessment it lacks specific strategies that can be used by educators. Wiliam (2010) further advanced the operationalization of formative assessment for educators through the creation of a five-point working definition:

1. Clarifying and sharing learning intentions and criteria for success.
2. Engineering effective classroom discussions, questions, and learning tasks.
3. Providing feedback that moves learners forward.
4. Activating students as the owners of their own learning.
5. Activating students as instructional resources for one another.

The formative assessment techniques in this quantitative study utilized the above working definition as a basis for the interventions used by the formative assessment cohorts.

Online healthcare education faces the unique challenge of not only having to ensure competent graduates but also the creation of healthcare practitioners who are self-regulated lifelong learners (Jouhari, Haghani, & Changiz, 2015). The ever-evolving nature of healthcare in addition to the stakes at risk (patients' lives) necessitates that

healthcare graduates stay vigilantly abreast of advances in medicine. Graduates of healthcare programs who have previously developed self-regulated learning practices within programs of study are much more likely to continue those practices post-graduation and become lifelong learners (Berkhout et al., 2015). Research has indicated that students who report greater levels of connectedness, satisfaction, learning and academic performance are more likely to exhibit self-regulated learning behaviors and to later become lifelong learners (Cho & Shen, 2013; Broadbent & Poon, 2015; Torenbeek, Jansen & Suhre, 2013).

Student persistence and retention to graduation has been a heavily postulated issue facing higher education (Knestrick et al., 2016; Trotter & Cove, 2005). Online higher education unfortunately has not been immune from the criticism with some arguing that online education faces significantly lower levels of persistence/retention when compared to face-to-face classrooms (Gazza & Hunker, 2014). Setting aside the potential differences between online and more traditional approaches to education increasing student retention is a goal shared regardless of delivery format. According to Gazza & Hunker (2014) student persistence/retention is an increasing problem to which healthcare education is not exempt. Research has indicated though that specific student outcomes may be directly related to whether a student chooses to persist within a course of study to graduation. Outcomes such as connectedness, satisfaction, learning and academic performance have all been linked to increased levels of student retention (LaBarbera, 2013; Styron, 2010; Sembiring, 2015).

Regardless of assessment strategy, it is safe to assume that the goal of any healthcare education program is to produce competent clinicians. The problem then, lies

in the method of evaluating competency. Epstein (2007) defined competence in medicine as an inclusive mixture of a student's ability to effectively communicate knowledge, technical skill, and clinical reasoning as well as reflect on knowledge and application towards the benefit of those being served. The aforementioned paradigm shift then revolves around the idea that competence cannot be described as a singular, high stakes achievement but rather a habit formed by learning for a lifetime (Leach, 2002). In order to promote lifelong learning, educators must adapt to assessment philosophies that are more conducive to a student-centered approach (Rushton, 2005).

Transactional Distance

Education is the process of disseminating information from one individual to another in the hopes that information can be fully processed and transformed into knowledge for the recipient. In order to effectively disseminate said information an educator within a traditional educational institution such as a K-12 or University setting must first bridge the divide between themselves and students as represented psychologically, hierarchically, pedagogically and physically. First described by John Dewey the concept of "transaction" implies that a learner undergoes transformation by interacting with the world around them and that the world around them is also affected through interaction; thus "knowing is doing" (Mishra, Worthington, Girod, Packard & Thomas, 2001, p. 325). The theory of navigating the distance between educators and learners is called "Transactional Distance" (Moore, 1993).

According to Moore (1993) transactional distance is a concept that helps describe the relationship between educators and students when physically separated. In terms of online education, the environment presented to students including course design,

assignments, activities and interactions can all affect how a student interacts with course content. Transactional distance though can be lessened through increased purposeful interactions (Moore, 1993).

Transactional distance can further be exacerbated due to perceived power distances between students and educators. Power differences exist between learners and healthcare educators which affect all levels of education but are especially prevalent in the “Ivory tower” of higher education (Baldrige, 1971; Ellsworth, 1992; Sissel, Hansman & Kasworm, 2001). These power differences exist partly out of hierarchal nature of the educational institution where the instructor is seen as a subject matter expert and the learner as a receptacle of information. Transactional distance takes into account these power differences as they relate to communications that take place in a variety of conditions such as within a traditional face-to-face classroom or virtual environment. Distance education is especially vulnerable to issues of transactional distance as not only do power divides exist between educators and students but also physical geographical differences which can make communications difficult to navigate and interpret (Moore, 1993).

Healthcare distance educators attempt to bridge the transactional physical location divide through the use of multimedia tools which seek to not only imitate a traditional classrooms’ instructor to student interactions but to further enhance and improve upon traditional models (Shin, 2003). Educators use discussion board forums in addition to other forms of communication technology to help students gain a greater understanding of course content while encouraging peer-to-peer (p2p) education. By purposefully creating environments for p2p “creation of knowledge”, educators are encouraging what

Kowitz and Smith (1987) “defined as the third and most advanced form of instruction” (Moore, 1993, p. 33). Through the utilization of ever increasing technological advancements healthcare educators are able to communicate with students from across the world in real time virtual classrooms which can simulate real world environments.

Providing effective distance education requires increased time and effort during initial phases of development by educators to actively ensure that communication and content delivery scaffolding is in place to help facilitate successful course completion (Shin, 2003). Over-structuring a course can eliminate much needed course “dialog” between educators and students in essence increasing the transaction distance. Understructuring a course can provide ample opportunities for dialog but unless closely monitored course objectives are easily lost in the translation (Moore, 1993).

Online healthcare educators who actively take steps to breakdown the power distance between themselves and students will commonly experience greater student outcomes (Moore, 1993). A major component of formative assessment is two-way communication from instructor to student and student to instructor. A decreased power distance serves to enhance communication from student to instructor while authentically leading to a free flow of ideas, questions and concerns without fear of judgement. Students will feel a greater sense of connectedness to their instructor and course content helping to facilitate the learning process. Research has further shown that when students feel as though they are able to freely communicate with instructors they also report higher levels of course satisfaction, academic performance, knowledge gaps are more easily bridged, learning is increased and students are more likely to be retained within a program of study (Hart, 2012; Shin, 2003).

Trends in Online Healthcare Education

Self-Regulated Learners

A strong trend in online healthcare education is the development of “self-regulated” learners (Wang, Shannon & Ross, 2013). Self-regulated learning refers to a student's ability to internally monitor and adjust effort, behaviors, motivations, and learning strategies in response to new information and feedback (Nicol & Macfarlane-Dick, 2006). Healthcare professionals depend on the skills of self-regulation in order to stay current with constantly changing published literature which helps direct patient care through evidence-based practices. Self-regulated learning requires students to put forth the required effort to achieve reasonable goals set forth by educators (Clark, 2012). The amount of effort required by a student will depend on individual factors such as previously developed foundational knowledge, studying habits, ability to self-reflect and capacity to adjust learning strategies in real-time (Hargreaves, 2005). A vital component of student self-regulation is regularly performing genuine internal reflection which helps students to identify strengths and weakness. The process of self-reflection further enhances student ownership over their academic performance serving to solidify persistence and achievement of goals (Yin et al., 2008).

Self-regulated learning within the online healthcare classroom requires that students participate in what is known as the “active constructive process”, which involves authentic dialog between peers, instructors and self (Abrami et al., 2011; Buskist & Groccia, 2011, Nicol & Macfarlane-Dick, 2006, p. 202). Additional tasks commonly associated with self-regulation and the active constructive process are effective note taking, class participation and intentional listening (Black & Wiliam, 2009; Weurlander

et al., 2012). Self-regulated learning is often the byproduct of student motivation and satisfaction, which an educator can positively influence by adopting authentic formative assessment strategies (Nicol & Macfarlane-Dick, 2006; Slavin, 2008).

Online healthcare educators can further promote self-regulation learning amongst students by providing additional opportunities to close knowledge gaps once identified (Black & Wiliam, 2009; Havnes et al., 2012; Wang et al., 2013). All too often in education instructors provide summative assessments in the hopes that students will self-identify knowledge deficiencies. If formative feedback is given at all it simply identifies current informational deficits with the assumption that a student will know how to effectively backfill in the deficiency (Knight, 2002). Although students may occasionally be able to bridge this gap, they are frequently unable to demonstrate this knowledge before educators move on to new subject matter (Clark, 2012). It is therefore not only important for online healthcare educators to provide effective formative feedback to encourage the development of self-regulated learning, but also to provide subsequent opportunities for students to validate that they have indeed bridged previously experienced deficiencies (Wang et al., 2013; Wiliam, 2010). An example of providing an opportunity to demonstrate this new knowledge is encouraging the re-submission of past assignments. This then completes a cyclical pattern of effective formative assessment and self-regulated learning methodologies (Nicol & Macfarlane-Dick, 2006).

Research has consistently shown that online students who demonstrate higher levels of self-regulated learning similarly reported greater overall satisfaction and learning while achieving higher academic performance (Puzziferro, 2008; Wang, Shannon & Ross, 2013; Yukselturk & Bulut, 2007). A study performed by Puzziferro

(2008) of 805 community college online students found that those students possessing characteristics of self-regulated learning (effort regulation, metacognitive self-regulation) were significantly positively correlated with both academic performance and satisfaction. Additionally, research has suggested that online course design be performed in such a way as to specifically promote self-regulated learning behaviors to increase student learning, satisfaction and academic performance (Wang, Shannon & Ross, 2013).

Interprofessional Education

Interprofessional education (IPE) online courses have also been a significant trend in online healthcare education over the last several years (Abu-Rish et al., 2012). IPE occurs when learners from a multitude of different but related educational focuses take courses together, in essence mimicking the professional environment. An example of IPE within an online healthcare course would be if students participating within said course had several different majors represented such as: Nursing, Physical Therapy, Respiratory Care, and Nutrition. The goal of such courses is to bring to bear different professional philosophies to give students an opportunity to work with students from varied backgrounds similarly to working with other healthcare professionals within a hospital setting (Reeves, Tassone, Parker, Wagner & Simmons, 2012).

The increase use of IPE is in direct response to the criticism that online healthcare education lacks the same student experience as those students participating in a face-to-face (F2F) classroom within the healthcare arena (Abu-Rish et al., 2012). Educational institutions providing online healthcare coursework commonly need to ensure similar educational opportunities as F2F students for accreditation purposes which becomes difficult without a single clinical site for students to learn within. The use of IPE

education within online healthcare courses then provides an avenue by which students of varying backgrounds can work together as part of a greater healthcare team similar to those experiences gained by students working within a hospital setting.

An emphasis on creating courses with students comprised from varied IPE backgrounds helps to simulate real world working environments where many different professions function as one cohesive healthcare team. A key component of IPE is the student-to-student learning which often leads to greater connectedness amongst course participants (Thistlethwaite & Moran, 2010). Students who report a greater sense of connectedness have been shown to also have greater course satisfaction, academic performance and a higher likelihood of persistence to graduation (Hart, 2012).

Educator Professional Development

Another trend in online healthcare education is the continuing professional development of educators to authentically evaluate their students' progress through the use of formative assessment practices (Moss, Brookhart & Long, 2013; Shute, 2008). Faculty commonly lack basic fundamental knowledge of philosophical underpinnings which allow for the delivery of authentic formative assessment. The majority of university college professors are simply subject matter experts by degree and on-the-job trainees in regard to effective educational philosophies. Complex educational methodologies of how to effectively transfer information, create assessments, provide feedback and adjust instructional methods are unfortunately treated as common knowledge amongst academic institutions. Further, the culture of academia does not encourage professors to seek out additional help when students are struggling (Golish & Olsen, 2000), especially in higher education where the cause of student difficulties are

often misunderstood as intrinsic to the learner (i.e. effort, ability and failing to be an “adult” learner).

More often than not, it is only through years of poor student performance and evaluations that a professor will be encouraged to seek remedial training (Golish & Olsen, 2000; Shute, 2008). Moreover, higher education continually perpetuates the devaluing of teaching by overly emphasizing and rewarding research/scholarly efforts. The “publish or perish” culture of academia is indeed a reality, which is directly related to promotion and tenure policies (Wolcott, 1997). All too often advancement within higher education is primarily focused on research output while teaching is given simply a passing glance, regardless of student performance or evaluations (Wolcott, 1997). Financial investments by institutions of higher education further add to the narrative that teaching is underappreciated, as funding is likely to be distributed to academic units which generate the most research and publicity (Wolcott, 1997).

Institutions of higher learning that aspire to enhance student performance by globally encouraging educators to utilize current evidence based teaching methodologies in conjunction with authentic formative assessment strategies, will need to strive to transform a very ingrained academic culture (Wolcott, 1997). Institutions can achieve a positive shift in this culture by incentivizing and investing in programs that produce superior educational outcomes. Additionally, traditional promotion and tenure policies that significantly emphasize scholarly activity over teaching will need to be decidedly refocused (Wolcott, 1997). It is not enough to simply recommend placing increased value upon teaching when it comes to career advancement for educators. The process of creation and delivery of effective teaching and assessment activities are time intensive,

which will likely take away from an educator's ability to perform research. In essence, universities need to understand that increases in teaching efforts will then decrease the ability for educators to perform heightened research requirements. A balance will need to be achieved amongst faculty within educational institutions which values equally teaching and research, to ensure the benefits of both exist to advance a university forward (Wolcott, 1997).

Issues of Online Healthcare Education

The Rise of Online Education

Online education has exponentially grown and evolved as technologies have advanced, from early forms of correspondence based instruction to today's use of computers, Web 2.0 and blended/hybrid course offerings (Casey, 2008; Matthews, 1999). Globally, popularity has steadily increased and specifically in the United States growth expanded rapidly during the late 1980's and early 90's as advancements in personal computers made it affordable for individuals to have home computers. A 2015 survey of trends in higher education estimated that more than 6.4 million students took one or more online education courses (Allen & Seaman, 2016).

The growth of online education and the potential that it brings has drastically changed the educational landscape with some postulating that the traditional bricks and mortar, face-to-face university model of educating students as outdated with its days numbered (Friedman & Friedman, 2013; Kezar, 2004; Ripley, 2012; Van Der Werf, 2002). The rise of online education though has not been without issues as commonly associated/partnered traditional higher education institutions continue to face increasing financial insecurities and public scrutiny (Ripley, 2012). Other issues such as lacking

student support, faculty training, university regulations, cost, successful course completion rates, and a general disconnect with employers have led some to call for an overhaul of the current online education system and the philosophies employed by it (Abrami et al., 2011; Attri, 2012; Van Der Werf, 2014).

Online Student Persistence/Retention

Persistence or retention in online higher education can be defined as a student's ability to complete a program of study, which has been reported as a major concern for universities as they continue to expand their online programmatic offerings (Boston, Ice & Burgess, 2012; Park & Choi, 2009). Attrition rates for online programs have been reported as upwards of six times higher than more traditional face-to-face programs of study (Patterson & McFadden, 2009). The concept of persistence and a student's subsequent attrition from an online higher education program of study is a complex, multifaceted issue upon which many educational researchers have postulated possible causes and solutions (Attri, 2012; Hart, 2012; Menchaca & Bekele, 2008).

According to Hart (2012) after performing a comprehensive literature review of 131 peer-reviewed articles, factors associated with student persistence include satisfaction with online learning, sense of belonging, motivation, peer support and "increased communication with instructor" (p. 19). A frequently cited theoretical framework to address many, if not all of the issues reported by Hart as well as other researchers is the Community of Inquiry (CoI) approach to delivery of distance education. The CoI framework was created by Garrison, Anderson & Archer (2000) as a hypothesized solution to address the growing issue of lack of online student persistence and rising attrition rates (Garrison & Arbaugh, 2007). The CoI model is presented as a

way for educators to evaluate characteristics of a course of study to ensure online learning effectiveness, student satisfaction, community, interaction and consequently persistence.

Community of Inquiry

CoI consists of three basic components that include the concepts of social presence, cognitive presence and teaching presence (Garrison & Arbaugh, 2007). Social presence within online education can be defined as a student's ability to portray themselves as they are in the real world both emotionally and socially (Kear, Chetwynd & Jefferis, 2014). Cognitive presence is the process by which a student becomes a “higher level thinker”, it involves the presentation of new information which then leads the learner to explore/reflect, integrate and ultimately apply new knowledge (Garrison & Arbaugh, 2007, p. 161). The two previously mentioned facets of CoI are important components of creating an encouraging environment for interaction within an online course of study but it is the third component, teaching presence, which provides the structure for these interactions (Garrison & Arbaugh, 2007).

Teaching presence is the “design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes” (Garrison, Anderson & Archer, 2000, p. 90). An educator's presence within a course is determined by three main components that help to facilitate successful learning outcomes. The first is the process of course development by an instructor that encompasses the planning, processes, level of interaction, types of interaction and assessment methodologies that will be used to deliver an online course. Examples of course development include the creation of multimedia lectures, webinars,

schedule of events, and syllabi that help to create the structure of an online program. The second aspect of teaching presence is how the instructor chooses to “facilitate discourse” which can be defined as the process by which students and educators create shared meaning, extend discussions beyond general surface information and encourage equal participation amongst students (Garrison & Arbaugh, 2007, p. 164). The third component of teaching presence is direct instruction and refers to how the instructor helps students to synthesize new information presented into higher order learning through assessment and feedback (Garrison & Arbaugh, 2007). Thus, teaching presence is the force which combines all the aforementioned factors (Garrison & Akyol, 2013).

When adopted by educators, the CoI framework has been shown to increase student-student, student-instructor and student-course material interactions (Shea, Li & Pickett, 2006). Creating community through these types of interactions has been shown to be a major contributing factor to whether a student persists within a program of study or chooses not to return (Boston et al., 2011). In an attempt to lessen attrition, online programs should encourage instructors to purposefully utilize the CoI framework. Educators who actively create/delivery courses following the CoI framework, have been shown to increase the likelihood that many of the main contributing factors associated with student persistence and online learning effectiveness will be achieved (Abrami et al., 2011; Attri, 2012; Garrison & Arbaugh, 2007).

Intentional Interaction

A major component of various theoretical frameworks investigating effective ways to provide distance education are focused on one main course characteristic, the concept of creating “interaction”. Traditional F2F course offerings allow the instructor to

authentically and naturally create interactions between themselves and learners through the use of pointed questions, requests for additional clarification and reflection.

Instructors can also create real-time student-to-student interactions through the use of small group projects which can help to create shared meanings and the creation of new knowledge (Kowitz & Smith, 1987). Further, interactions between course content and students can be emphasized in the traditional F2F classroom quickly through the use of application, Q/A and case study sessions. Unlike traditional F2F course offerings, distance education requires intentional efforts by educators to create natural interactions between instructors, students and course materials.

Many researchers have hypothesized that several issues associated with poor student outcomes in online education can be attributed to a lack of opportunity or emphasis placed by instructors in the creation of intentional interactions (Abrami et al., 2011). In artificial environments such as online education where students do not have the opportunity to formulate bonds within and outside of the classroom with each other and instructors, students can find themselves lost within a sea of multimedia technologies with no true connection to a course. According to Groccia & Buskist (2011) in an evaluation of the most effective evidence-based teaching methods, a major component was to ensure that students' "emotional, social and intellectual climate factors" were actively taken into consideration during the instructional design process (p. 9). Researchers have also indicated that effective instructional design takes into account more than just technological factors when creating an online course.

Design and organization refers to the planning and design of the course structure, process, interactions (Anderson et al., 2001). During this process, the instructor

establishes the course goals, provides clear instructions for participation behaviors and course activities, set deadlines and timeframes, and defines boundaries for student and instructor interaction (Arbaugh & Hwang, 2006; Shea, Li, & Pickett, 2006). This planning for interactions and online classroom management is essential to allow students the ability to meet course goals and learning objectives. Without this type of planning and direction, students may be lost and the ability to seek immediate assistance is not always available (Easton, 2003).

Course structure for asynchronous online courses is critical as online learners are often frustrated when they are unable to find needed material or feel lost in their courses (Swan, 2001). It is essential that online faculty and instructional designers create a consistent and sequenced course structure. For example, Swan and colleagues (2000) developed a course design process to create a 'solid' course structure. They advised faculty adhere to the following steps: (1) get started by reflecting and conceptualizing the course, (2) create an orientation, (3) chunk course content, (4) create learning activities, (5) walk through the course, (6) get ready to teach, and (7) evaluate and revise. The combination of a consistent course structure and engaged instructors who create dynamic interactions has been found to be the most consistent predictors of successful online courses (Swan, 2003). Typically, the course structure is developed prior to course implementation, yet adjustments can be made throughout the implementation process. Effective online educational design principles therefore actively tend to the humanistic nature of learning such as the need for a sense of community and belonging which is achieved by creating and encouraging interactions (Abrami et al., 2011; Hart, 2012; Wagner, 1994).

The role of intentional interaction within distance education and its effects on student learning cannot be overstated. Even within major models of instruction that are constructivist in nature and that emphasize the individual self-reflective nature of knowledge construction, interaction plays a major role (Hung, Jonassen & Liu, 2008). For example, Problem-Based Learning (PBL) requires group activities, sharing of knowledge gaps bridged, and ultimately “collaborative group processing” amongst fellow students and instructors, all functions that require extensive interaction (Hung et al., 2008, p. 494). In a comparison article of over 122 studies between individual learner focused versus collaborative courses with an interaction emphasis, it was found that a collaborative course design had “significantly more positive effects than individual learning on student individual achievement...and several process and affective outcomes” (Lou, Abrami & d’Apollonia, 2001, p. 449). Further, Johnson and Johnson (2009) performed an exhaustive review of “collaborative learning” and pointed specifically to what is referred to as “promotive interactions” as a driving force behind student learning successes (p. 366). Promotive interactions have been found to be most effective when instructors encourage students to collaborate by: acting in a trusting way, seek mutual benefit for mutual goals, keep anxiety/stress low, provide effective feedback to one another, challenge each other to achieve higher knowledge creation and be open to others’ points of view (Johnson & Johnson, 2009).

Educators designing and delivering distance education should provide ample opportunities for students to effectively interact with one another by designing assignments that reflect the valuable contribution student-student interactions provide. Effective student-student interactions that follow the characteristics identified by Johnson

and Johnson (2009) have not only been shown to positively affect student learning outcomes but also to promote the development of self-regulated learning (Abrami et al., 2011). Student to instructor interactions further play an important role in student learning outcomes and reported student satisfaction within distance education. Instructors should ensure that feedback to students is timely, frequent, individualized and focused on helping students to further develop subject matter expertise (Hart, 2012; Menchaca & Bekele, 2008; Rovai & Downey, 2010). Educators should also create opportunities for students to interact directly and effectively with course materials by encouraging personal responsibility, self-reflection and other self-regulated learning principles (Abrami et al., 2011; Kim, Park & Cozart, 2014; Corry & Stella, 2012).

Key Learner Attributes in Online Education

In addition to the technical aspects of a course's' delivery format student learner attributes also have to be taken into consideration by educators to avoid over/under structuring a course. Student populations who appear to be more self-directed will be more accepting of a low level of structure with higher emphasis on self-discovery of content information and higher levels of dialog with educators and fellow students (Moore, 1993).

Students who are traditionally considered more dependent learners will find increased comfort in highly structured courses that provide additional “how to” support services. Some researchers have stated that non-traditional adult learners are more dependent upon instructor guidance and therefore would benefit from highly structured courses, at least in the beginning phases of re-entering the higher education system. Non-traditional adult learners are an important aspect of distance education as they have

consistently been one of the larger segments of the distance education student population base (Matthews, 1999; Sissel et al., 2001).

Nontraditional students are an increasingly growing segment of online education that are often characterized by an increased average age in addition to having an increased potential for other stressors such as family obligations, full time working status, and delayed entry into postsecondary education (Snyder & Dillow, 2012; Park & Choi, 2009; Sissel et al., 2001). As a vulnerable student population with external forces that make persistence within an academic program difficult if not impossible to maintain, it is vital for educators to ensure that adequate support/communication structures are in place to eliminate barriers that might not otherwise be perceived by traditional students who require less support and structure (Moore, 1993; Shin, 2003; Sissel et al., 2001).

Problem Statement

Currently, there is a void in the strategies of how best to assess student performance in online healthcare education while encouraging the development of self-regulated lifelong learners who persist to graduation (Kettle & Haubl, 2010; Taras, 2010; Rohe et al., 2006). Increased performance outcomes have been acknowledged by many theoreticians in the importance of developing self-regulated lifelong learners, and identifying where the knowledge gap exists is how educators help develop this type of learner through assessment practices (Berkout et al., 2015; Clark, 2012). Learner assessment performed by educators is a key performance indicator in the effectiveness of instruction provided (Black & Wiliam, 2009). Healthcare educators need to not only be aware of the pros/cons of the types of assessment they utilize, but how said assessment

effect student outcomes such as connectedness, satisfaction, learning and academic performance.

According to Wiliam & Thompson (2007) assessment is a key component in successful instruction; whereby the process of assessment is the primary source in deciphering if instructional goals have resulted in anticipated learning outcomes. Assessment tasks assigned, whether in the form of exams, quizzes, papers or clinical practicum have value only to the degree that they provide feedback and remediation to both the educator and learner (Sadler, 2010). The knowledge gained from assessment results is only useful if instructors are willing to adapt course curriculum to help direct future performance of their students (Dennen, 2008). Lastly, assessment practices have been shown to directly affect previously discussed student outcomes (connectedness, satisfaction, learning, academic performance) which in turn have an effect on issues facing online healthcare education.

Purpose of Study

The purpose of this study was to compare the effects of formative and summative assessment practices used within a university online healthcare course on student's perceptions/outcomes specific to connectedness, satisfaction, learning and academic performance. Students reported these target dimensions when compared to past experiences and performance. Student perceptions will be representative of key successful learner's attributes in the online Computer-Supported Collaborative Learning (CSCL) environment. The knowledge gained through this research provides additional information for educators to understand how students perceived their connectedness, assessment, learning and course satisfaction after experiencing formative assessment

methods. This study demonstrates that formative assessment can effectively be used to positively impact student outcomes, which may in turn help to further develop self-regulated lifelong learners while increasing persistence/retention rates.

Higher education healthcare students are commonly taught by educators who employ assessment methodologies which focus on two main areas of emphasis: summative assessment or assessment *of* learning, and formative assessment or assessment *for* learning (Epstein, 2007; Taras, 2010). Assessment *for* learning has been postulated as a more extensive form of formative assessment consisting of identifying where a student is at in their knowledge obtainment and in turn using that information to help scaffold future student success (Broadfoot et al., 2002). Assessment *of* learning is more concerned with accreditation and ranking purposes which is summative in nature, providing minimal guidance for future success of both healthcare educators and students (Rushton, 2005). Effective information delivery from educators to students is directly linked to the use of appropriate assessment methodologies (Clark, 2012).

Research has indicated that while the use of formative assessment methods within healthcare higher education is not a new construct, the authentic implementation of this assessment method is frequently underutilized (Black et al., 2003; Burkist & Groccia, 2011). While multiple studies have shown the positive effects of the use of formative assessment on student outcomes, how formative assessment strategies should be used in healthcare education has been underrepresented in the literature (Cauley & McMillan, 2010; Epstein, 2007). Additionally, research regarding how educators should effectively use formative assessment methods within online education is significantly lacking (Gikandi et al., 2011). While research has shown that student outcomes can be positively

impacted depending upon assessment methods used by educators; much of the research performed has been within the face-to-face classroom and/or K-12 education, rather than online higher education within the discipline of healthcare (Gikandi et al., 2011; McMillan, Venable & Varier, 2013).

According to Kohn (2011) the delivery of summative grades can cause students to become disinterested in course work and have an overall lower academic performance. The increased anxiety that accompanies awarding grades within a course, shifts the focus from knowledge acquisition to score obtainment. On the other hand, evaluation methodologies such as formative assessment removes the emphasis placed upon the summative portion of evaluation and has the potential to increase a student's ability to become a self-regulated lifelong learner (Clark, 2012; Nolen, 2011). Studies of courses that place a higher emphasis on formative assessment techniques and decreased if not eliminated summative scoring, have reported greater student performance and motivation (Cauley & McMillan, 2010). Therefore, this research study has been designed, to gain a greater understanding of the role that formative assessment methodologies play in an online healthcare education course in regards to student connectedness, satisfaction, learning and academic performance of students.

Lastly, although the purpose of this study is not to directly measure student retention/persistence (a known issue within online education) the variables that are being measured all have been shown to have a direct relationship to retention/persistence (Styron, 2010; Patterson & McFadden, 2009). Online academic programs have been shown to have significantly more student dropout and a lack of persistence among their students, a problem postulated upon by many scholars (Gazza & Hunker, 2014; Knestruck

et al., 2016; Patterson & McFadden, 2009). Previous research though has demonstrated students who develop a greater sense of connectedness, course satisfaction and higher academic performance are more likely to persist throughout an academic program (Abrami et al., 2011; Sembiring, 2015). Therefore while this study directly measured student's sense of connectedness, satisfaction, learning and actual academic performance, it also measured variables that can significantly affect whether online students develop into self-regulated learners who persist within a course of study and are retained to graduation.

Research Questions

The research question for this study is “Is there a statistically significant difference in online healthcare students’ overall sense of course satisfaction, connectedness, learning and academic performance based upon the type of assessment methodology utilized?”. The null hypothesis is written as follows:

H_0 : In the population, there is no difference between the two *AS* treatments in regards to the vectors of means on the dependent variables of *CS*, *CNT*, *LN* and *AP*.

H_A : A difference exists between *AS* treatments in regards to the vectors of means on the dependent variables of *CS*, *CNT*, *LN* and *AP*.

(Independent assessment variable (*AS*); dependent variables course satisfaction (*CS*), student connectedness (*CNT*), student learning (*LN*) and academic performance (*AP*)).

The four sub-questions for this study are as follows:

1. What effect does formative in comparison to summative assessment practices used within a university healthcare online course have on student perceptions of connectedness to their peers, instructor and delivered course content?
2. What effect does formative in comparison to summative assessment practices used within a university healthcare online course have on student perceptions of overall course satisfaction?
3. What effect does formative in comparison to summative assessment practices used within a university healthcare online course have on student perceptions of their learning that occurred?
4. What effect does formative in comparison to summative assessment practices used within a university healthcare online course have on student academic performance as represented by final grade earned?

Key Terms and Definitions

As a way to provide consistency and clarity for the purposes of this study, key terms will be defined as follows:

- *Assessment*- a term that serves two primary purposes: the collecting of information commonly for measurement and the utilization of said information for individual/institutional improvement (Astin, 2012).
- *Assessment for Learning*- is the process by which information collected during the assessment phase of education is utilized to help further educate students, thus narrowing present knowledge gaps (Taras, 2010).
- *Assessment of Learning*- is the process by which students are evaluated, measured and ranked based upon performance on a summative assignment (Taras, 2010).

- *Cognitive Presence*- is the degree to which learners are able to create meaning through self-reflection and discussion within an online community (Diaz et al., 2010).
- *Community of Inquiry*- a theoretical framework that seeks to explain the process of “knowledge creation” by learners through a collaborative constructivist approach via: Social, Cognitive and Teaching presence (Garrison, 2007).
- *Connectedness*- a term that refers to the relationship a student perceives between themselves and their academic environment. A connection felt by students to course content, fellow classmates and educators which serves to increase individual commitment to academics (Garrison, 2007).
- *Evaluation*- the use of gathered information for the “rendering of value judgements”, this term refers to how the results of measurement are used to help improve or rank students (Astin, 2012, p. 3).
- *Formative Assessment*- The collection of information concerning student performance in order to help further both teaching practices and student knowledge acquisition (Black & Wiliam, 2009).
- *Persistence*- a student measurement which indicates the consistent progress of a learner through a program of study.
- *Retention*- commonly an institutional term/measurement used to define a student's likelihood of progressing from start to finish in a program of study.
- *Self-Regulated Learning (SRL)*- is a term that refers to an individual's active participation in the formulation of goals and the active regulation of activities in order to achieve said goals. Self-regulated learners develop and expand upon

“meta-cognitive” strategies including: self-verbalization, self-evaluation and self-consequences in an effort to achieve performance goals (Clark, 2012, p. 216).

- *Social Presence*- the connection students feel they possess between one another within an online community, often “realized through affective expression, open communication and group cohesion” (Diaz et al., 2010, p. 23).
- *Summative Assessment*- the measurement of student knowledge acquisition through the use of examinations and the like for the purposes of ranking students commonly for reporting purposes (Taras, 2010).
- *Teaching Presence*- is the facilitation of cognitive and social processes by educators to guide students toward learning outcomes through course design and direct instruction (Diaz et al., 2010).

Summary

The study presented here addresses the problem that current assessment practices used within online healthcare education are often limited to the summative ranking and grading of students. Many of the problems facing online healthcare education though such as the lack of development of self-regulated learners, persistence and retention rates have been shown to be directly positively affected by formative assessment practices. The goal of formative assessment is to transform the role of assessment into a process by which the student is efficiently directed to improve upon areas in their learning which are currently holding them back. In turn educators are further advancing their own educational practices by better understanding the needs of students and how best to reach them.

The research design of this study is quasi-experimental in that the independent variable (*AS*) is manipulated by the researcher and random assignment of participants to treatment groups was not used. Instead participants were assigned to treatment groups based upon historical enrollment records to help ensure equal populations for both treatments groups. Data analysis was performed via a one-way ANOVA in order to find significant differences between assessment approaches and student connectedness, satisfaction, learning and academic performance. The data analysis test of MANOVA was considered but it was ultimately decided that ANOVA was the appropriate test to be used, a further explanation of this rationale is provided in chapter three.

Data used in this study evaluated student's level of perceived connectedness, satisfaction, learning and academic performance as represented by final course grade. These student outcomes have previously been linked to the development of self-regulated learning as well as persistence/retention rates for students within online programs of study. The results of this study demonstrate the effects of summative and formative assessment practices on student outcomes delivered within an online healthcare course.

CHAPTER TWO: LITERATURE REVIEW

Introduction

Chapter two will evaluate literature deemed as relevant to this study. Section one defines and evaluates traditional forms of assessment used within online healthcare education. Subsequent sections will define and evaluate formative assessment methods indicating how this type of assessment is authentically performed. The next sections explore assessment in healthcare education, variables linked to persistence and retention and ways in which formative assessment can be integrated within educators' professional development continuing education. The final section provides a summary of the literature that was used as the basis for the development of this research study. Additionally, the above sections will be discussed in relation to the primary constructs investigated by this study: student connectedness, satisfaction, learning and academic performance.

Summative Assessment

The most common approach used to assess student learning in healthcare education is through the use of quantitative summative assessment (Black & Wiliam, 2009; Knight, 2002, Norcini, Lipner & Grosso, 2013). Summative assessment is characterized by the cumulative scoring of student progress, traditionally after a section of a course is taught and a culminating examination is given (Dennen, 2008). The purported benefits of this form of assessment are in its ability to rank participants against fellow students, identify learning objective deficits and to provide "accountability for various stakeholders" (Shute & Kim, 2014, p. 313). The reliability and validity of

summative assessment is predicated upon educators effectively creating and delivering an assessment testing that which was postulated upon (Knight, 2002; Mislevy, 1994). A major constraint to this type of assessment is its lack of connection to improving teaching practices utilized by healthcare educators in the future, let alone within instruction (William & Thompson, 2007). Summative assessment is frequently viewed as evaluating a student's ability to understand the presented course materials and further a product of student effort (Yin et al., 2008). The results of such assessments are therefore rarely used to identify specific knowledge gaps present within individual students or potential improvements that should be made in order to effectively deliver course content (Popham, 2009).

Summative assessment feedback provided to students by educators, especially on standardized exams such as those used for professional credentialing, is routinely delivered in the form of a sum total score (Havnes, Smith, Dysthe & Ludvigsen, 2012). It then falls upon the student to identify where knowledge deficiencies lie. Low performing students as well as students with exceedingly high academic expectations, can have significant demotivational associations when an unexpectedly low summative grade is earned (Black et al., 2003; Hargreaves, 2005). Students develop anxiety in association with poor summative assessment performance, which has the potential to create a chain reaction of subpar performances on subsequent assessments (Hwang & Chang, 2011). Increased student anxiety, in addition to decreased motivation, creates an environment in which maximal student learning cannot be achieved and poor student outcomes can be anticipated, a less than optimal mix when working with patients in a hospital setting.

Student outcomes such as connectedness, satisfaction, learning and academic performance are also directly affected by the type of assessment methods deployed by online healthcare educators. Research performed by Drouin & Vartanian (2008) has demonstrated students report being less connected to course content, educators and their peers when the primarily assessment methods used are summative in nature. Academic performance has also been shown to be greatly affected by the type of assessment approach utilized within education (Carrillo-de-la-Pena et al., 2009). Additionally, research performed by Weurlander et al. (2012) demonstrated that student learning and retention of information presented by educators is considerably diminished when assessment methods used are principally summative.

Healthcare educators can further find their teaching efforts undermined by awarding summative measures, as the psychological response of receiving an unanticipated high or low grade can lessen a student's desire to self-reflect upon feedback provided regardless of grade achieved (Li & De Luca, 2014). This phenomenon is evident when educators award summative scores to writing assignments which include extensive feedback to a student (Gibbs & Simpson, 2005). A student who expects a higher grade than achieved will commonly become disheartened and defensive in regards to their writing, searching only through feedback for areas in which they can protest. A separate student receiving a higher than expected grade also has the potential to disregard feedback, as their diminished efforts equated to a higher grade than anticipated. The act of placing a summative score onto an assignment serves only to reinforce that the assignments' primary objective is to attain a high mark; rather than focusing on the process of becoming a more proficient writer (Popham, 2009). A cyclical pattern begins

to emerge throughout a student's academic career, with low scores decreasing the potential for a student to internalize feedback, leading to lower performance on subsequent writing assignments. Online healthcare educators who deemphasize the use of summative assessments and increase the use of formative assessment will find students more likely to internalize delivered feedback, improving future performance (Weurlander et al., 2012).

Formative Assessment

Formative assessment is a progressive form of evaluation for both healthcare students and educators which can be referred to as “assessment *for* learning” (Fraenkel, Wallen & Hyun, 1993; Stiggins, 2002). The process of assessment is utilized to not only support student learning but also to provide real-time feedback for instructors to make changes to instruction based upon assessment findings (Dennen, 2008). Formative assessment is therefore administered more frequently than traditional forms of summative assessment, to ensure that teaching strategies are congruent with student needs. Unlike summative assessments students play a prominent role in providing insights of how instruction can be adjusted to narrow current knowledge deficits (Havnes et al., 2012; McMillan, Venable & Varier, 2013). The processes by which formative assessment evidence (i.e. clinical observations, homework, testing) is gathered are less relevant in comparison to ensuring that results be “used as feedback by teachers and student to improve teaching and learning, respectively” (Shute & Kim, 2014, p. 313). Research has demonstrated that the effective use of formative assessment strategies by healthcare educators has the potential to double the speed at which students learn course material

while increasing student's motivation to learn and ability to become a self-regulated learner (Shute & Kim, 2014; Wiliam, 2006; Rudolph et al., 2008).

The characteristics of effective formative assessment include four main components: role of assessment, frequency of assessment, format of assessment and feedback (Shute, 2008). The role of assessment *for* learning prioritizes the process used by educators to optimize student learning while enhancing instructional methods (McKeachie & Svinicki, 2013; Nolen, 2011). Unfortunately, adjusting instructional strategies in response to student feedback is one of the least utilized components of formative assessment by educators, as well as being the least emphasized during professional development (Shute & Kim, 2014). The frequency by which assessments are provided should be reasonably commonplace, this helps healthcare educators to refocus educational materials delivered throughout the course. Multiple assessment sources should be evaluated to authentically evaluate student knowledge while clearly identifying learning gaps (Black et al., 2003). The most important component of formative assessment is feedback, from student to student, instructor to student and student to instructor (Hattie & Timperley, 2007). Feedback should be provided as a helpful constructive guide to advance student learning and instructional practices without the pretense of being “judgmental” (Shute, 2008). A task that can be difficult given the lack of context and tone that can frequently accompany online correspondence.

Research performed by Weurlander et al., (2012) on 70 medical students demonstrated that the use of formative assessment served as a “learning tool” for students “contributing significantly to the process and outcomes of learning” (p.747). A study by Carrillo-de-la-Pena et al. (2009) demonstrated that students who participated in formative

assessment had significantly higher academic performance. Student satisfaction has been frequently shown to be directly related to instructor feedback, a major component of formative assessment. Research performed by Eom and Ashill (2016) using “structural equation modeling” based upon 379 responses from students who had completed at least one university online course demonstrated that formative instructor feedback was a strong predictor of student satisfaction and achievement of course learning outcomes.

Formative Feedback

The delivery of effective formative assessment feedback is a way for healthcare educators to “reduced discrepancies between current understandings and performance and a goal” (Hattie & Timperley, 2007, p. 86). Providing formative feedback though is all too often a time-consuming process for educators to navigate (McKeachie & Svinicki, 2013; McMillan et al., 2013). Especially for healthcare educators who have traditionally only provided feedback in the form of summative grading with the occasional justifying of said grade in the event that a student asks for feedback post-assessment (Evans, 2013; Hattie & Timperley, 2007; Li & De Luca, 2014). Assignments which are commonly summative in nature such as multiple-choice examinations, require less time to create and grade (Shute & Kim, 2014). Conversely, formative focused assignments seek to gain a greater depth into the current understanding that students possess. Formative based assignments in turn frequently are associated with greater time requirements during assessment creation and evaluation (Shute & Kim, 2014).

Several researchers have identified increased time requirements as a barrier for educators to provide authentic formative assessment (McKeachie & Svinicki, 2013; McMillan et al., 2013). The component of formative assessment which commonly

requires the greatest time expenditure is the identification of individual student knowledge gaps and the subsequent specific instructional feedback to bridge those gaps (Clariana, Wagner & Murphy, 2000). The identification of general deficiencies that an entire class of students might possess can be evaluated through traditional assessment methods such as quizzes, homework assignments or examinations. The results of such assessments can be further broken down into an item analysis of each question to identify themes that a preponderance of the class appeared to be deficient in. Course content can then subsequently be adjusted in order to scaffold these general gaps in knowledge (Yin et al., 2008). Effective formative assessment though treats students as individuals, seeking to provide individualized formative feedback specific to a student's needs creating a greater impact on academic performance.

Researchers have further found that interaction between student-instructors in the form of formative feedback positively effects student outcomes. In a meta-analysis of 74 research studies performed by Bernard et al, (2009) it was found that interaction was significantly related to an increase in student learning and academic performance. Students who have greater academic performance have also been shown to have greater overall satisfaction with their educational experience and in turn are more likely to persist to graduation (Hart, 2012).

Purpose of Formative Feedback

Feedback is more effective when in the context of correct answers provided by a student rather than incorrect, as it helps build upon foundational knowledge instead of what is currently unknown (Shute, 2008). Feedback provided based upon previous knowledge allows a student to develop the skills needed to self-identify errors in thinking

patterns, which directly supports the development of self-regulated learning (Nicol & Macfarlane-Dick, 2006). Feedback should be provided to students which helps to identify the level of performance that is expected within a course (Shute, 2008; Vonderwell & Boboc, 2013). The expected level of performance indicated by instructors, should be congruent with goals set forth within the course of study. Performance expectations should neither be over or under stated as both of these actions can lead to decreased motivation, increased frustration and lower student performance (Black & Wiliam, 2009; Kohn, 2011). Feedback should be provided which is specific to the stated intention of an assignment, avoiding extraneous content which is unrelated (Shute, 2008). An example of this misalignment would be a writing assessment with the stated outcome to “create community” amongst students and the accompanying feedback primarily focusing on grammar/punctuation.

According to Hattie and Timperley (2007) the effectiveness of formative feedback administered by educators is dependent upon the “level” of feedback provided (p. 90). The four levels of feedback are characterized by the specific focus of content delivered by instructors to students (Hattie & Timperley, 2007). The concentration of each level is differentiated as being directed toward task, process, self-regulation or self (Hattie & Timperley, 2007). Task driven feedback is primarily summative in nature with a focus on identification of which answers are correct and consequently incorrect as well.

Feedback that is process directed helps students to further understand the “meaning” of how and why they arrived at the knowledge they currently possess, feedback then informs students in how to adjust learning strategies to improve future knowledge acquisition (Evans, 2013; Li & De Luca, 2014). Process emphasized feedback

is more useful in the advancement of higher learning amongst students in comparison to task specific feedback (Havnes et al., 2012). Self-regulated feedback is provided in relation to a student's internal dialog in determining how much effort should be put forth, willingness to seek out instructor feedback, and the overall managing of personal behaviors (Hattie & Timperley, 2007; Hwang & Chang, 2011; Nicol & Macfarlane-Dick, 2006). Personal feedback that is directed to a student's "self" (i.e. "Good effort") is the least effective form of formative feedback. This form of feedback lacks any connection to identification of knowledge gaps or how to improve performance and should be used sparingly as a way to advance learning outcomes (Hattie & Timperley, 2007).

Formative feedback delivered from healthcare students to instructors can be an especially challenging process to navigate, due to complex power differences that commonly exist between the two (Golish & Olson, 2000). Power differences between students and instructors affect a student's willingness to give constructive feedback. Students frequently find it difficult to overcome the fear of offending an educator who has the power to negatively impact final course grades (Cauley & McMillan, 2010; Hwang & Chang, 2011). Healthcare educators need to ensure that appropriate mechanisms are in place to support student feedback in regards to effectiveness of instructional methods employed. Students will gain more confidence in their abilities to contribute to the future delivery of course content, clinical competencies and instructional methods, if educators actively create a safe culture of openness (William, 2006; Leach, 2002).

Healthcare educators can gain student trust by demonstrating and articulating changes that are being made in real-time to student feedback (Rushton, 2005). Another

option, especially early in an academic course of study, is to provide a pathway for students to provide formative feedback anonymously. Anonymity allows students who are less likely to naturally come forward with suggestions to have a greater sense of power to do so, without facing potential repercussions from instructors and/or judgement from fellow students (McKeachie & Svinicki, 2013). Further, as providing formative feedback to instructors could be a foreign concept for many students, providing a structured guide or past examples can help to expand effective dialog (Black & Wiliam, 2009; Havnes et al., 2012).

Timing of Formative Feedback

The timing of when formative feedback is provided by and subsequently delivered by a healthcare educator, is a major contributing factor to the effectiveness of feedback (Hattie & Timperley, 2007; Mislevy, 1994; Rushton, 2005). Timing of feedback provided has the potential to affect student learning outcomes on a similar level to the content provided within the feedback itself (Black et al., 2003; Li & De Luca, 2014; Nicol & Macfarlane-Dick, 2006). The perception of educator responsiveness including promptness of replies to queries has been linked to student satisfaction, motivation and persistence within a course (Hart, 2012). Persistence is identified as a student's' ability to advance through a course of study with a clear link to attrition rates, a major concern within distance education programs. Promptly delivered formative feedback can be immediately used by students to backfill in identified knowledge gaps which serves to scaffold the creation of new knowledge (Hattie & Timperley, 2007).

Researchers have further indicated that although the delivery of prompt feedback is generally preferred by students, providing delayed feedback can further student

learning under the right conditions (Evans, 2013; Hattie & Timperley, 2007).

Immediately delivered feedback is effective when in the context of a task, such as an assignment indicating correct and wrong answers or within a clinical setting (Leach, 2002). Immediate feedback provides students with the ability to quickly identify learning errors, serving to rapidly redirect efforts (Hattie & Timperley, 2007). Delayed feedback allows the student additional time to process information encouraging the practice of internal dialog reinforcing self-regulatory development (Li & De Luca, 2014). Authors have further postulated that the degree of difficulty associated with an assignment should dictate the timing of feedback (Clariana et al., 2000). Assignments which are considered to require more intellectual effort should be provided with delayed feedback as they commonly require more time for students to fully process. In contrast, assignments which require less intellectual effort should be provided with immediate feedback as extra processing time is unwarranted (Clariana et al., 2000; Hattie & Timperley, 2007).

Formative Assessment and Self-Regulated Learning

The impact of formative assessment on student academic performance in addition to promoting self-regulatory learning behaviors has been well established (Black & Wiliam, 2009; Nicol & Macfarlane-Dick, 2006). Self-regulated learning refers to a student's ability to internally monitor and adjust effort, behaviors, motivations, and learning strategies in response to new information and feedback (Nicol & Macfarlane-Dick, 2006). Self-regulated learning requires students to put forth the required effort to achieve reasonable goals set forth by educators (Clark, 2012). The amount of effort required by a student will depend on individual factors such as previously developed foundational knowledge, studying habits, ability to self-reflect and capacity to adjust

learning strategies in real-time (Hargreaves, 2005). A vital component of student self-regulation is regularly performing genuine internal reflection which helps students to identify strengths and weakness. The process of self-reflection further enhances student ownership over their academic performance serving to solidify persistence and achievement of goals (Yin et al., 2008).

Self-regulated learning requires that students participate in what is known as the “active constructive process”, which involves authentic formative dialog between peers, instructors and self (Abrami et al., 2011; Buskist & Groccia, 2011, Nicol & Macfarlane-Dick, 2006, p. 202). Additional tasks commonly associated with self-regulation and the active constructive process are effective note taking, class participation and intentional listening (Black & Wiliam, 2009; Weurlander et al., 2012). Self-regulated learning is often the byproduct of student motivation and satisfaction, which an educator can positively influence by adopting authentic formative assessment strategies (Nicol & Macfarlane-Dick, 2006; Slavin, 2008). Whereas summative assessment has been linked to increased anxiety, decreased motivation and student performance; in contrast formative strategies are associated with increased motivation, reported satisfaction and increases in achievement of student learning outcomes (Black & Wiliam, 2009; Hart, 2012; Knight, 2002; Kohn, 2011; McMillan et al., 2013).

Healthcare educators can further promote self-regulation learning amongst students by providing additional opportunities to close knowledge gaps once identified (Black & Wiliam, 2009; Havnes et al., 2012). All too often in education instructors provide summative assessments in the hopes that students will self-identify knowledge deficiencies. If formative feedback is given at all it simply identifies current

informational deficits with the assumption that a student will know how to effectively backfill in the deficiency (Knight, 2002). Although students may occasionally be able to bridge this gap, students are frequently not able to demonstrate this knowledge before educators move on to new subject matter (Clark, 2012). It is therefore not only important for educators to provide effective formative feedback to encourage the development of self-regulated learning, but also to provide subsequent opportunities for students to validate that they have indeed bridged previously experienced deficiencies (William, 2006). An example of providing an opportunity to demonstrate this new knowledge is encouraging the resubmission of past assignments, this then completes a cyclical pattern of effective formative assessment and self-regulated learning methodologies (Nicol & Macfarlane-Dick, 2006). Self-regulated learning is the primary way that healthcare practitioners will stay current with an ever changing medical profession, consequently building these skills as a student is important for future professional growth (White & Fantone, 2010).

Assessment in Healthcare Education

Healthcare education has a long history of the use of summative assessment practices in the evaluation of students within its programs of study (Epstein, 2007). Boulet (2008) notes that the high stakes nature of healthcare education predicates itself easily to the pass/fail nature of summative assessment. The rationale being that a healthcare professional either is or is not competent in performing a certain set of skills upon a patient population. Evaluation of student progress/performance is therefore a black & white affair with as little grey provided as possible. Additionally, Norcini, Lipner and Grosso (2013) found that the summative assessment of healthcare students provides

easy justification for educational institutions and for future employers of students to show competency had been achieved on a variety of fronts in regards to evidence based practices. The pass/fail nature of these summative competency based education philosophies lends itself to certification, licensure and credentialing practices as well (Norcini et al., 2013). The attainment of those professional credentials further lessens the legal responsibilities of employers to ensure competency of their future newly hired employees.

Summative assessment practices within healthcare education clearly play a role in the evaluation of students within higher education although the process is not without its detractors as well (Cook & Beckman, 2006; Epstein, 2007). Problems have arisen in the reliability and validity of summative exams throughout time. According to Clauser, Margolis and Swanson (2008) assessment of healthcare student's knowledge acquisition based upon summative evaluation is predicated upon the strength of the summative assessment itself. Healthcare educators whom exclusively utilize summative in nature assessments should be sure to pay special attention to the process of question creation so as to ensure accurate information is being relayed to the student (Downing, 2003).

Healthcare education has also more recently seen a shift in focus towards what is known as Problem Based Learning or PBL (Polyzois, Claffey & Matteos, 2010). Problem based learning is student centric revolving around the ideals that information is more easily disseminated and retained by students if it is presented in the form of an open-ended problem. Healthcare students who experience PBL are commonly presented with a patient scenario and asked the actions they would recommend (Polyzois et al., 2010). PBL lends itself to healthcare education since upon graduation working within the

profession of healthcare graduates will find themselves consistently working as part of a team which solves problems in the form of patient diagnoses and treatment recommendations (Polyzois et al., 2010). Further PBL (much like the treatment of patients) is a process/formative based approach with less focus upon the pass/fail structure commonly found within summative emphasized education (Norman & Schmidt, 2000). The treatment of patients for graduates from healthcare programs is an evolving process which does not have only one perfect path. Healthcare professionals must be able to work within grey areas of understanding, function as part of a team, understand their own personal knowledge gaps and be open to paths of treatment that might not have been previously realized (Rudolph et al., 2008).

According to Polyzois, Claffey and Mattheos (2010) the traditional summative approach to healthcare education heavily focused upon passing summative assessments, severely limits the full potential of a student-centered PBL approach to educating future successful healthcare practitioners. Formative assessment lends itself to PBL within healthcare education by encouraging students to work as part of a team to determine the best course of action in solving problems presented. Students are also more likely to take educational risks in determining treatment plans since the formative approach emphasizes the process and how a student gets to their answer more so than summative approaches. In a study of eighty-five healthcare learners Sargeant et al., (2003) found that “self-assessment” is a major component of PBL within healthcare education which furthers the development of a learner’s ability to explore their own gaps in understanding. Conversely, summative assessment neither lends itself to students taking educational risks or the exploration of knowledge gaps within PBL. Therefore, other assessment

approaches such as formative should be considered by healthcare educators (Boulet, 2008; Epstein, 2007; Sargeant et al., 2003).

Variables of Persistence & Retention in Online Education

Numerous studies have noted that persistence and retention within online higher education programs of study is a multifaceted problem that needs to be addressed (Hart, 2012; Styron, 2010). Online healthcare education has historically not been exempt from lower student retention and a lack of persistence especially when compared to their face-to-face counterpart classrooms of study (Gazza & Hunker, 2014). Student retention is especially problematic for healthcare programs due to its connection with accreditation requirements for the programs they reside within (Gazza & Hunker, 2014). Studies have also shown difficulties in the authentic calculation of student persistence and retention rates among online programs, considering the flexibility many students have to start/stop taking courses at any given time (Howell, Laws & Lindsay, 2004). Online healthcare programs face a dilemma in setting length of graduation terms as to accurately calculate overall program retention and persistence to degree attainment.

Calculating attrition rates for distance education programs is a complex task at best and impossible at worse. Consequently, comparing these identified attrition rates to traditional forms of course delivery can be a challenging process leading to disastrous results for online education (Howell, Laws & Lindsay, 2004). Problems can arise due to the way that attrition rates are calculated, student demographics typical of online education and an overall lack of understanding of distance education itself. Online programs can unfairly be judged based upon student factors that they have no control over while being held to a higher standard than traditional face-to-face programs

(Howell, Laws & Lindsay, 2004). No current algorithm exists in order to accurately calculate attrition rates within distance education. Further, to compare attrition rates of students who self-select as traditional students to students who self-select as online students confounds the process (Howell, Laws & Lindsay, 2004).

Distance education students are also more likely to be identified as part-time students and in turn utilizing a traditional “finish in four” timeframe is inappropriate for attrition rate calculations. Online students are more likely to be non-traditional adult learners who have additional time requirements which require them to potentially stop a program of study and then restart said program during a different academic year (Sissel, Hansman & Kasworm, 2001). Even comparing dropout rates within the same institution can prove to have confounding variables. A study performed by Kemp (2002) demonstrated that traditional classroom students who dropped out during the add/drop period were not considered a part of overall attrition, while online programs within the same institution students who dropped during the add/drop period were in fact considered a part of the attrition calculations. A lack of accurate accounting of attrition rates and other confounding variables such as general student characteristics needs to be further investigated if valuable information is expected to be obtained and utilized (Howell, Laws & Lindsay, 2004). Real time assessment of retention therefore necessitates the need to understand and measure variables that have been shown to affect student persistence/retention overtime (Garratt-Reed, Roberts & Heritage, 2016).

Researchers have noted that while many students who choose to cease taking online courses report issues such as work-life balance, change in career direction and financial obligations other education based variables have also been reported (Gazza &

Hunker, 2014). Studies have shown that students are more likely to persist within an online health care course and be retained to graduation if they have a greater sense of social presence within said course (Mayne & Wu, 2011; Park & Choi, 2009). Social presence can be defined as student connectedness to fellow classmates and more broadly to educators. Further research has shown that variables such as reported levels of course satisfaction has been linked to increase retention amongst online healthcare learners (Gazza & Hunker, 2014). While researchers such as Allen, Robbins, Casillas & Oh (2008) in a study of 6,872 college students demonstrated that academic performance was strongly linked with retention to program completion, overcoming persistence/retention issues within online healthcare education programs is clearly complex. Researchers have demonstrated that educators can positively affect student outcomes by focusing efforts on helping students feel a greater sense of satisfaction, community, connectedness and academic performance (Drouin, 2008; Gazza & Hunker, 2014, Hart, 2012, Styron, 2010).

Professional Development for Formative Assessment

A less frequently discussed barrier (especially in institutions of higher education) to the successful adoption of effective formative assessment strategies are online healthcare “educators” themselves (Moss et al., 2013; Shute, 2008). Faculty commonly lack basic fundamental knowledge of philosophical underpinnings which allow for the delivery of authentic formative assessment. The majority of university college professors are simply subject matter experts by degree and on-the-job trainees in regards to effective educational philosophies. Complex educational methodologies of how to effectively transfer information, create assessments, provide feedback and adjust instructional methods are unfortunately treated as common knowledge amongst academic institutions.

Further, the culture of academia does not encourage professors to seek out additional help when students are struggling (Golish & Olsen, 2000). Especially in higher education where the cause of student difficulties is communicated to be issues intrinsic to the learner such as effort, ability and/or failing to be an “adult” learner.

More often than not, it is only through years of poor student performance and evaluations that a professor will be encouraged to seek remedial training (Golish & Olsen, 2000; Shute, 2008). Moreover, higher education continually perpetuates the devaluing of teaching by overly emphasizing and rewarding research/scholarly efforts. The “publish or perish” culture of academia is indeed a reality, which is directly related to promotion and tenure policies (Wolcott, 1997). All too often advancement within higher education is primarily focused on research output while teaching is given simply a passing glance, regardless of student performance or evaluations (Wolcott, 1997). Financial investments by institutions of higher education further add to the narrative that teaching is underappreciated, as funding is likely to be distributed to academic units which generate the most research and publicity (Wolcott, 1997).

Authentic formative assessment is infrequently used by healthcare educators, as teaching practices are more commonly based upon traditionally summative approaches, rather than current evidence based philosophies (Slavin, 2008). According to Groccia and Buskist (2011) the satirical nature of institutions of higher education is that although they are committed to the “discovery, transformation, and dissemination of knowledge, the choice of teaching strategies is based largely on experiential, commonsense, or anecdotal evidence” (p. 6). Educator mentoring and professional development programs should ensure that formative assessment philosophies are heavily encouraged during faculty

training, as a means to positively impact student learning outcomes. Although, formative assessment is not a perfect science, educators frequently report issues such as increased time requirements, concern over the uncertainty of standardized test scores and students' willingness to adopt new forms of assessment (Nolen, 2011; Shute, 2008; Slavin, 2008).

Faculty Development and Academic Culture

Higher education institutions continue to face an ever increasing lack of state appropriated funds to support their mission/vision (Berge, 2007). As these historically available funds cease to exist institutions will need to explore new funding models if growth, advancement and a competitive edge is hoped to be achieved. One such model utilized frequently within higher distance education is the "self-support" structure which entails online programs to develop, deliver, and administer courses in a quasi-independent nature from the parenting institution (Rovai & Downey, 2010). The self-support model potentially allows a program to have greater flexibility over course offerings, administrative decisions and financial decisions. Institutions receive a percentage of funds generated from these self-support programs for investments made in initial startup costs and support services provided to deliver course content. Self-support programs are then responsible to generate their own revenue in which a percentage of the profits continually goes back into the program. The model of self-support is attractive to institutions and academic programs alike as the financial obligations are relatively low for organizations and the potential for growth/expansion are high for programs of study. While the self-support model within distance education is a potentially attractive option to bridge financial deficits it is not without its difficulties (Rovai & Downey, 2010).

As more academic programs explore the route of self-support models there is an increasing call to enroll more and/or higher quality students and a way to do this is to provide distance education on a global scale. As programs provide new degrees or convert traditionally f2f courses into distance educational offerings the need for effective online educators is ever increasing (Allen & Seaman, 2015). A major barrier identified by researchers in the development and identification of online educators is an academic culture which views distance education as being less effective than f2f courses (Berge, 2007; Black, 1993). Although extensive research has been performed which shows the effectiveness of online education in relation to student outcomes there are still a percentage of faculty and administrators who question its quality (Miller & Pilcher, 2001; Bower, 2001). Additionally, university policies commonly further this perception through the use of restrictive promotion/tenure guidelines that ultimately devalue the process of creating and delivering distance education, thus demotivating new faculty from participating in online teaching (Jones, Lindner, Murphy & Dooley, 2002; Shea, 2007).

Developing current and/or future faculty to teach within the online arena can further be a difficult challenge experienced by administrators. Research has indicated that an increased time requirement exists to design and deliver effective online education; a barrier to both new faculty and current faculty who feel increasingly stretched thin with research, teaching and service obligations (Berge, 2007; Jones et al., 2002). Faculty can also view technological advancements as a barrier if confidence within one's' personal skillset is not adequate (Bruner, 2007). A lack of interaction with students and feelings of isolation can further demotivate faculty from engaging in distance education which can make it difficult to convert traditional f2f educators into online instructors. Although

research has clearly indicated that the level of interaction with students within an online course can easily match if not exceed that of a traditional f2f course (Bower, 2001; Epper Bates & Bates, 2001). Faculty also report a lack of institutional compensation/recognition for the amount of time and effort it takes to deliver effective online education as a motivational barrier to teach online (Green, Alejandro & Brown, 2009). Extrinsically, financial compensation is an important motivating factor to teach online, especially for non-tenured track faculty such as adjuncts who traditionally make up the majority of online educators for an academic program (Gaillard-Kenney, 2006). It is therefore vital for administrators of online programs to clearly articulate to prospective and current faculty the specific mechanisms in place to provide adequate support, compensation, and recognition if recruitment/retention are to be expected.

Tenured, tenure-track, non-tenure track and adjunct faculty report a multitude of similar motivations behind the desire to teach online in addition to some position specific differences. Similarities exist amongst these various groups of professionals in regards to the desire for university support/recognition, flexible work schedules, and adequate compensation for efforts put forth. Non-tenured track and adjunct faculty further have a desire to “gain additional teaching experience” by taking advantage of opportunities that might not otherwise be available by participating in distance education (Green et al., 2009, p. 9). Tenured faculty are additionally motivated to teach online if appropriate individual connections are maintained within the academic institution.

Supplemental educator training is a crucial component that needs to be in place for any higher education organization to ensure effective teaching methodologies are utilized, but especially important for distance educators given the complex nature of the

platform. Online educators should have frequent training opportunities regardless of the position they hold within an institution. New faculty also would further benefit from mentoring programs which team more experienced faculty with less experienced faculty, which also serves as a way to ensure quality (Green et al., 2009). Effective educator training should consist of pedagogical strategies to increase students' sense of community, interaction and higher order learning (Bower, 2001; Menchaca & Bekele, 2008). Faculty should also be provided with training that addresses the use of technological tools to further support course design, delivery and pedagogical approaches (Green et al., 2009; Jones et al., 2002). Lastly, training should be provided that encourages educators to within reason utilize their autonomy to innovate within course design/delivery to help facilitate the advancement of distance educational philosophies.

Summary

Distance education has grown worldwide at an exponential rate of expansion which creates both important opportunities and complex threats to academic institutions (Allen & Seaman, 2015). Additionally, institutions of higher education are facing increased competition for students in an exceedingly difficult financial environment, with many subsequently turning to added distance educational offerings as a possible solution. However, providing effective online education is a challenging task, without advanced planning and management strategies in place many academic programs will fail (Rovai & Downey, 2010). Frequent criticisms of distance education continue to be perpetuated in regards to implementation difficulties with advancing educational technology, quality of educational experience, intensifying student expectations, and growing concerns over attrition rates (Allen & Seaman, 2015; Rovai & Downey, 2010).

If these challenges are to be overcome, it is necessary for academia to radically alter and reinterpret how traditional paradigms of effective education are perceived (Rovai & Downey, 2010). A preponderance of research has been created which demonstrates that online education programs have a significantly higher attrition rate in comparison to more traditional face-to-face programs (Attri, 2012). Some research has further demonstrated that the problem of attrition within distance education is upwards of seven times higher than face to face programs, a problem that clearly needs to be addressed (Boston, Ice & Gibson, 2011). A frequently identified component of attrition, is the impact cultivation of student persistence can have in education, this is especially imperative to the successful delivery of distance education (Boston, Ice & Gibson, 2011).

Increased transactional distance is the byproduct of distance education which serves as a barrier to students' natural abilities to informally build a sense of community and persist within an academic program (Shin, 2003). It is therefore important for educators to intentionally build into course curriculum both student to student and student to instructor purposeful interactions, which serve to facilitate the development of a "Community of Inquiry" (Garrison & Arbaugh, 2007). It is paramount for educators to fully understand the importance of developing a sense of community within their courses and students. Students who report feeling as though they are a part of a greater community have a higher commitment to academic programs and institutions as a whole (Garrison & Arbaugh, 2007). Persistence is increased amongst students who identify a "connection" within a program increasing the likelihood of successful completion while decreasing attrition (Hart, 2012).

The recruitment and retention of effective educators and administrators will play a vital role in the successful advancement of distance education programs and in turn institutions of higher education (Hixon et al., 2012). Educators should further be properly provided with the necessary technological tools to deliver distance education, which can be costly for some institutions (Bruner, 2007). Additionally, frequent professional development opportunities should be provided which ensure that evidence based pedagogical principles are used by distance educators to enhance student academic performance (Bruner, 2007). Administrators need to be cognizant that designing and delivering effective distance education requires additional time in comparison to traditional face to face forms of educational delivery. Distance educators consequently should be appropriately compensated for their increased efforts, as indicated by accurate teaching workloads and/or financial compensation. Lastly, an academic cultural shift which authentically values/supports distance education and educators needs to occur if traditional educational institutions aspire to remain relevant in the future of education.

This study will examine how changes in assessment methods used within a university healthcare online course changes the student experience and outcomes when compared to past experiences and performance. The knowledge gained through this research will provide additional information for educators to understand how students perceived their connectedness, assessment, learning and course satisfaction after experiencing new assessment methods; with a goal to demonstrate that new methods could effectively be used in the future while potentially improving upon more traditional assessment philosophies.

CHAPTER THREE: METHODOLOGY

Overview

This quantitative research study was focused on the effects of formative assessment methods deployed by online healthcare educators evaluating student course outcomes and perceptions. The results of this study can be used to identify how the use of specific formative assessment methods will potentially affect student's sense of satisfaction, connectedness, learning and academic performance. Further, this study will help online healthcare educators develop a deeper understanding of the impact assessment techniques can have in regards to student learning outcomes.

Research Questions

The research question for this study is “Is there a statistically significant difference in online healthcare students’ overall sense of course satisfaction, connectedness, learning and academic performance based upon the type of assessment methodology utilized?”. The null hypothesis is written as follows:

H_0 : In the population, there is no difference between the two *AS* treatments in regards to the vectors of means on the dependent variables of *CS*, *CNT*, *LN* and *AP*.

H_A : A difference exists between *AS* treatments in regards to the vectors of means on the dependent variables of *CS*, *CNT*, *LN* and *AP*.

(Independent assessment variable (*AS*); dependent variables course satisfaction (*CS*), student connectedness (*CNT*), student learning (*LN*) and academic performance (*AP*)).

The four sub-questions for this study are as follows:

1. What effect does formative in comparison to summative assessment practices used within a university healthcare online course have on student perceptions of connectedness to their peers, instructor and delivered course content?
2. What effect does formative in comparison to summative assessment practices used within a university healthcare online course have on student perceptions of overall course satisfaction?
3. What effect does formative in comparison to summative assessment practices used within a university healthcare online course have on student perceptions of their learning that occurred?
4. What effect does formative in comparison to summative assessment practices used within a university healthcare online course have on student academic performance as represented by final grade earned?

Methods

This quantitative research study was completed in order to find differences between student outcomes specific to connectedness, satisfaction, learning and academic performance based upon educator use of formative and summative assessment practices. A quasi-experimental research design was used to test the causal hypotheses represented within the primary research questions and four sub-questions. By definition a quasi-experimental design does not include “random assignment” of participants into treatment

groups and the independent variable is manipulated by the researcher (White & Sabarwal, 2014, p. 1). Participants were assigned to treatment groups based upon historical enrollment data as a way to help ensure equal populations between the two groups.

The primary course chosen for evaluation was a three-credit, 400 level upper division, fully online healthcare course within a university setting: RESPCARE 444: *Leadership and Management for Healthcare Professionals*. The course was transformed to allow for only formative assessment to be delivered throughout the semester. Formative assessment students in the first and fourth cohorts (Fall 2015, Fall 2016) were surveyed post final grade submission to explore student perceptions such as course satisfaction, connectedness, learning and academic performance. Data was collected and stored on university servers for future evaluation and statistical analysis.

Course redesign for formative assessment cohorts followed the five-point working definition for formative assessment set forth by Wiliam (2010). First, learning targets were created and shared with students via the development of course objectives which focused on disseminating learning intentions and the criteria for success within the course. The objectives were displayed within the course syllabi, delivered as an announcement and frequently linked to formative feedback delivered. Second, student learning was constantly monitored/evaluated through the creation of instructor-initiated discussion questions that were required to be extensively answered via a discussion board. Third, extensive feedback was provided for all assignments both in real-time and weekly in the form of audio, written and personalized rubrics. Fourth, students were required to perform “self-assessment” in the form of comparing their assignments to examples provided in addition to being encouraged to assess their own learning to course

objectives for each assignment. Lastly, peer-to-peer learning was heavily emphasized especially within discussion forums as a place to take educational risks and to receive additional insights/explanations from fellow students within their cohort.

The target course was then redesigned once again to provide a primarily summative based assessment approach with grades being awarded via a traditional points system. The summative assessment second and third cohorts of students took this course (Spring 2016, Summer 2016) after which they were surveyed post final grade submission. Data was once again stored for future analysis and statistical interpretation on university servers.

Course redesign for summative assessment cohorts followed a more traditional “business as usual” summative assessment approach to online healthcare education. The focus of the role for assessment conversely to formative cohorts was mainly concerned with the ranking of students. Course objectives and learning targets were once again identified within the syllabi but were not referenced outside of said document or attached to any specific assignments. Student learning was monitored in regards to how a student performed summatively on assignments and how they compared to the rest of their cohort. Weekly feedback provided to students was in the form of a summative score and an individual rubric which justified the score earned. Students were not specifically encouraged to perform self-assessment of their learning. Lastly, a greater emphasis was placed upon summative assignment scores with average course scores being presented for each learning activity as a way for students to compare themselves to others within the course.

Participants

The target participants for this research study were undergraduate healthcare students who were enrolled in RESPCARE 444: *Leadership and Management for Healthcare Professionals*, a three credit 400 level online course. Students were recruited to participate in this study voluntarily; informational/reminder emails were sent during weeks two and five. A final email was sent with a link to the survey after course completion and grades submitted to the university. Study participant demographic information such as gender, geographical location, common courses, previous online experience, level of education, and GPA are provided in chapter four.

Instrument Design and Development

A quantitative survey was considered the best approach to evaluate assessment methodologies used in a course and their corresponding relationship with student outcomes. The primary focus of the assessment tool development survey was the Online Student Connectedness Survey (OSCS), Community of Inquiry (CoI) survey and the Classroom Community Scale (CCS) (Appendix A). OSCS is a 25-item instrument evaluating community, comfort facilitation and interaction/collaboration (Bolliger & Inan, 2012). The CoI instrument created by Garrison et al., (2000) utilizes 34 questions covering three main foci social presence, cognitive presence and teaching presence. Lastly, the CCS is an instrument evaluating 10 questions concerning “connectedness” and 10 questions focused on “learning” (Rovai, 2002). All three surveys were referenced frequently and were structured around similar theoretical frameworks as the survey that was ultimately created. The framework used possessed four primarily sections:

Connectedness, Satisfaction, Learning and Academic Performance as represented by final course grade earned.

Questions were utilized from the CoI and CCS surveys primarily with the final created survey possessing a length of 25 questions plus two qualitative questions, to gather additional reference data if needed at a later date. The primary purpose of the created survey was to assess how a change in an assessment philosophy within an online healthcare course affects the student experience when compared to past experiences. It was felt that if an educator could understand how students perceived their connectedness, satisfaction, and learning after experiencing a new assessment method; one could demonstrate that the new method could safely be used in the future while potentially improving upon more traditional assessment philosophies.

After survey creation a concern arose that the survey might take too much time to complete, but after piloting the survey to a few small groups it took approximately 5-7 minutes which was considered reasonable. Piloting procedure guidelines were utilized that helped to ensure clarity of instructions, clarity of questions, minimization of leading as a way to avoid bias and timeliness to help increase response rate (Newman & McNeil, 1998). Questions and directions for the survey were also slightly modified based upon feedback received during the initial piloting of the survey before deployment.

Another challenge during survey development was understanding how and when information would be obtained from students. It was felt that having a pre-survey of the student's baseline results would be valuable in order to understand how those results had changed throughout the course, after which the students would be surveyed post-course and the two sets of results would be compared. This research method proved not needed

and problematic considering the importance of keeping student data anonymous and the potential for students to perceive that their responses could possibly affect their final course grades. After consulting with the chairperson of the IRB committee, it was felt that a better format would be to eliminate the pre-survey completely and to deliver a post-course survey only after grades had been delivered to ensure anonymity as well as to have the least impact on the students. Students would then be retrospectively comparing their experience in the course with the new assessment methods to previous online college courses they had taken before.

The instrument used in this study was created to obtain quantitative data of students within a 400 level, three-credit, fully online university healthcare course as it relates to student connectedness, satisfaction and learning. The target constructs were selected for evaluation due to their influence upon a student's probability to persist within a course of study within an online course and to further be retained within a program to graduation. Although the instrument created does not directly measure student persistence and retention it does collect data on constructs that have been significantly linked to increasing the potential for both (Hart, 2012). Additionally, the target constructs are also known to influence a student's likelihood of developing self-regulated lifelong learning behaviors an important trait for healthcare providers to possess (Broadbent & Poon, 2015; Clark, 2012).

Questions were generated when possible, using two previously validated and reliable surveys the Classroom Community Scale (CCS) created by Rovai, 2002 and the Community of Inquiry (CoI) created by Garrison et al., (2000). The CCS (Rovai, 2002) has been shown to successfully identify two interpretable factors amongst students

participating in distance higher education: Student connectedness and student learning.

The CoI survey (Garrison et al., 2000) has been shown to identify “presence” as it relates to social, teaching and cognitive realms within distance higher education.

Student response options were generated using a Likert scale following suggested criteria set forth by Uebersax (2006). The response scale contained several consecutive criteria that were evenly distributed with a neutral integer ranging from agreement to disagreement. The survey responses included: (1) Strongly Disagree, (2) Disagree, (3) Neither Agree nor Disagree, (4) Agree, (5) Strongly Agree. The use of a Likert scale allows the data to be evaluated as continuous variables since the distance between responses is more or less equal. Study participants with scores on a given survey question greater than 3.0 would indicate a perception in agreement with the item question proposed; scores of less than 3.0 would indicate a participant perception of disagreement with the item question. The overall mean agreement/disagreement score on each section of questions would then indicate perceived level of connectedness, course satisfaction, learning and assessment methods were increased or decreased in comparison to past online courses they had completed. The final two survey questions (26 & 27) were qualitative; respondents were given the opportunity to provide open ended responses for information that might have been missed during the previous quantitative section of the survey. The complete survey is provided in Appendix B.

The variable of student connectedness was explored through the formation of five questions: (1) I felt less isolated in this course; (2) I felt more connected to my instructor in this course; (3) I felt more connected to others in this course; (4) I felt more confident that others would support me in this course; (5) I have greater trust in my instructor in

this course. Question one is a direct question from the CCS survey whereas questions 2-5 are modifications of questions used within the CCS survey to better reflect the student experience within the target course (Rovai, 2002).

The variable of satisfaction was explored through the formation of seven questions: (6) I felt the instructor provided greater feedback that helped me to understand my strengths and weaknesses, relative to the course's goals and objectives; (7) The instructor provided extensive feedback in a timely manner; (8) Assessment methods used in this course were unique but reasonable; (9) Assessment techniques used in this course helped to create a less stressful learning environment; (10) I achieved learning objectives more efficiently due to the assessment methods employed in this course; (11) I was able to focus on learning course content versus "grades", due to the assessment methods used in this course; (12) I found the grade negotiation process to be an interactive, value-added practice. All of these questions were required to be self-generated by the researcher as previously validated instruments could not be found that would be able to reflect the unique aspects of the target construct assessment satisfaction for the purposes of this study.

The variable of learning was explored by using eight questions taken directly from the CCS which pertained to said variable by (Rovai, 2002): (13) I felt that I was encouraged to ask questions; (14) I felt more at ease in exposing gaps in my knowledge of course content; (15) I felt that I was given ample opportunities to learn; (16) I felt my educational needs were met; (17) The instructor encouraged course participants to explore new concepts in this course; (18) I utilized a variety of informational sources to explore problems posed in this course; (19) Learning activities helped me to construct

stronger explanations/solutions in this course; (20) Reflection on course content and discussions helped me to understand fundamental concepts in this class. It was felt that the student's perspective in regards to their personal learning was an important complementary component to be evaluated as it related to academic performance.

The variable of course satisfaction was explored by using five questions taken from the CoI survey as created by Garrison et al. (2000): (21) The instructor clearly communicated important course topics; (22) The instructor clearly communicated important course goals; (23) The course was effectively organized; (24) I am satisfied with this course; (25) I would recommend this course to fellow students. In addition to the above quantitative questions, two qualitative questions were also generated by the researcher in the event that further information could be valuable to this study: (26) What are the major strengths of this course? (27) What are the major weaknesses of this course? Questions 26/27 were ultimately not used within this quantitative study.

Data Validity & Reliability

In order to ensure clarity of the survey questions created and to provide increased validation of the instrument, two groups of five students were asked to fill out the survey as a pilot test. All students in the pilot testing phase were previously accepted into the Respiratory Care program and were at the rank of Junior. Each group was timed to ensure completion of the survey was under the 10-minute desired time to completion. Upon completing the survey each group was queried question by question to ensure that no difficulty was had in interpreting the desired information being asked and that each question was fully understood. All instrument questions were deemed to have the clarity desired with the survey taking between 5-7 minutes for completion (Newman & McNeil,

1998). The pilot testing provided valuable information to ensure a clear, timely and validated instrument was being used.

The instrument was further validated considering the majority of questions were taken either directly or were slight modifications of questions used in two previously validated studies the CCS (Rovai, 2002) and the CoI (Garrison et al., 2000). The CCS has further been validated in subsequent studies to consistently demonstrate student's levels of connectedness and learning (Ouzts, 2006; Shea, 2007). Factor analysis data has established that the CCS possesses both validity and reliability with a Cronbach's alpha of 0.92 for connectedness and 0.87 for learning (Zimmerman & Nimon, 2017).

The CoI has also been deemed as reliable and validated by subsequent studies by other researchers efficiently showing social presence, cognitive presence and teaching presence (Arbaugh et al., 2008; Swan & Ice, 2010). Arbaugh et al. (2008) demonstrated that the CoI survey was a reliable tool with Cronbach's alpha levels ranging from 0.91-0.95 for the three presences identified. Other studies have also tested the validity of the survey data to identify the three presences and the correlating constructs such as connectedness and learning with Boston et al. (2011) demonstrating that 76% of the "cumulative variance" being accounted for, and that regression analysis had a "high degree of confidence in the validity" of the survey instrument (p. 74). Rovai (2002) performed a study on 375 online university students using the CCS which demonstrated a "Cronbach's coefficient of 0.91-0.93" as well as factor analysis using "direct oblimin rotation with a rotated loading of over 0.3" demonstrating construct validity of classroom community and its relationship to connectedness and learning (Zhang et al., 2011, p. 594).

Data Collection

The survey instrument was created and deployed utilizing the *Qualtrics* survey software system within the university this research took place. Students were batch emailed by the *Qualtrics* software at the completion of each cohort's course, after final grades had been formally submitted to the university. The anonymous data once collected was then stored on the servers provided for research purposes within the university. The data obtained via *Qualtrics* was then pulled and stored onto a university computer for statistical analysis utilizing *SPSS*. Study population data was generated after identifying participants through the use of grade rosters and academic advisor access to individually evaluate 172 student transcripts utilizing *PeopleSoft* student information system.

Data Analysis

Collected data was analyzed with a One-Way ANOVA consisting of an independent variable with 2 treatments or levels and four separate continuous dependent variables. Analysis via a MANOVA test was considered but it was felt that since three of the dependent variables (connectedness, satisfaction, learning) were from the participant population while academic performance was from total population, combining all four variables into one test would be inappropriate as they were representative of two separate populations. Additionally, the independent variable (*AS*) is comprised of two groups while post-hoc analysis for MANOVA requires three.

ANOVA has the ability to identify the main effects and strength of association between independent and dependent variables. The independent variable was the product of two separate methods of assessment used within four separate cohorts of students which were combined into two cohorts (formative and summative) labeled as (*AS*). The

first three dependent variables are based upon data collected during the post-course survey which utilizes a rating scale assessing student perceived course satisfaction (*CS*), student connectedness (*CNT*) and learning (*LN*). The rating scale used includes five levels (1=Strongly Disagree, 2 Disagree, 3= Neutral, 4=Agree, 5=Strongly Agree). Although the rating scale technically has five categories the distances between the levels are considered reasonably equal and the concept of satisfaction, connectedness and learning are considered as continuous allowing all to be dependent variables. The fourth dependent variable, academic performance (*AP*), was gathered via a post-course evaluation of students' culminating course grade achieved. The purpose of this research was to determine the effects upon students' sense of overall course satisfaction, learning and feelings of connectedness to fellow students/instructor and academic performance in the presence of different assessment methodologies utilized: formative and summative.

The first step in performing the ANOVA was to ensure that all assumptions for the test were met (Hatcher, 2013). The assumptions of ANOVA require that homogeneity of variance (variance in populations), independence (correct data collection) and normal distribution (distribution of means) of data are all met (Hatcher, 2013). ANOVA is a valuable tool for researchers to test their null hypothesis which includes more than one dependent variable in relation to one or more independent variables (Hatcher, 2013). Descriptive statistics were used to assess the central tendency (mean) and standard deviations (distribution) of each cohort studied. ANOVA results were analyzed to evaluate the influence of *AS* on the dependent variables *CS*, *CNT*, *LN* and *AP*. Statistical significance was considered any relationship between variables with an alpha level of .05 or less ($p < .05$).

Post-hoc analysis required a separate one-way ANOVA to be performed for each dependent variable *CS*, *CNT*, *LN* and *AP* for a total of four. The *F*-statistic was then investigated to determine if statistical significance existed between any of the independent and dependent variables ($p < 0.05$) (main effects). If any dependent variables were identified as significant, the strength of the relationship was evaluated based upon the eta squared (η^2) which according to Hatcher (2013) can be interpreted as “ $\eta^2 = .01$ small effect, $\eta^2 = .06$ medium effect $\eta^2 = .14$ large effect” (p.363). ANOVA also indicates *F*-statistics associated with interaction effects “amongst” the dependent variables that were interpreted for statistical significance as any association amongst these variables would affect statements that could be made in regards to the study's analysis (Hatcher, 2013).

Summary

The findings of this study will demonstrate the impact that both formative and summative assessment practices have on student connectedness, satisfaction, learning and academic performance used within an online healthcare course. Results from this study will be relevant for educators in that they will be able to identify assessment best practices in order to help positively impact both the development of self-regulated lifelong learners and persistence/retention rates within the online healthcare environment. This study is relevant for both administrators as a way to focus areas of professional development and educators to improve upon teaching practices, as higher education institutions continue to expand online course offerings.

CHAPTER FOUR: DATA ANALYSIS AND RESULTS

Introduction

The purpose of this study was to evaluate the practice of summative and formative assessment methods used within an online healthcare course and the relationship of said methods to student connectedness, satisfaction, learning and academic performance. A survey was created to reflect student perceptions of connectedness, satisfaction and learning while final course grades were used to identify academic performance. The survey consisted of 25 quantitative questions and two qualitative questions (26 & 27). The two qualitative questions were not evaluated or included in this study as neither question was previously validated and past research has called for more quantitative studies when evaluating the effects of assessment practices (Black & Wiliam, 2009).

Statistical analysis in the form of ANOVA using SPSS was used to evaluate constructs which were deemed statistically significant in order to identify any correlation between interventions used and constructs being researched. Assumptions for ANOVA, specifically independence of cases, normality and equality of variance, were all met before data analysis was performed. The following chapter communicates the results of the data analysis performed during this quantitative research study. The chapter is separated into the following sections: demographics, common courses/academics, data analysis results, summary of chapter. Research questions and future research suggestions are discussed in Chapter 5.

Demographics

The target population for this research study was higher education healthcare students who were taking courses via an online format. The research study targeted a goal of 60 student participants to ensure an appropriate sample size. A final population of 172 students were surveyed after six students were excluded due to not finishing the course. A sample size of 109 students chose to participate in the survey provided. Student connectedness, satisfaction and learning was evaluated based upon information gained from student survey participants. Academic performance as well as demographic information was obtained through the evaluation of the total population. The response rate for the survey was therefore 109 out of a possible 172 equaling 63.4%. The population for this research study consisted of 108 females (62.8%) and 64 males (37.2%) (see Table 1). Geographical locations of the total surveyed population represented 34 states and one international student, frequencies of two or less were identified as “other” (Figure 1).

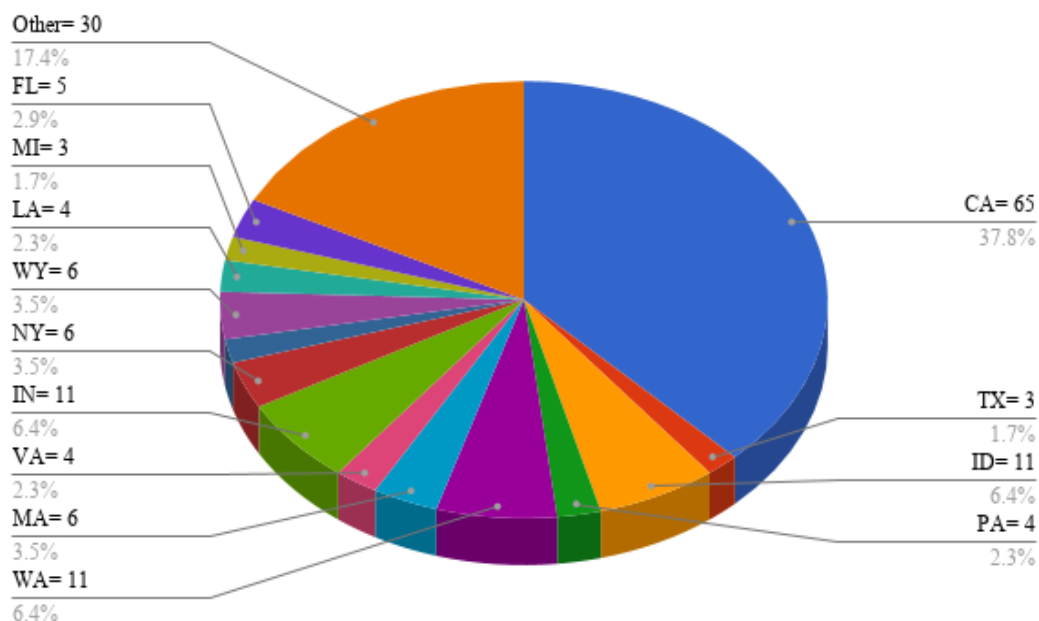


Figure 1 Location of Students

Table 1 Gender

Identification	Frequency	Percentage
Female	108	62.8%
Male	64	37.2%
Total	172	100%

Common Courses/Academics

Students who participated in this study were required first to be accepted into the RRT-BS Degree Advancement Program (DAP). Academic requirements included two paths before entrance was granted. The first was a student could have an Associate's of Science degree from a regionally accredited institution and be considered "core certified", in addition to passing a national registry exam in Respiratory Care. The second path was that they could have an Associate's of Applied Science degree and meet the university's requirement or state board of education requirements in order to be "core

certified” along with passing the professional examination. A review of all 172 student transcripts demonstrated that 163 (94.76%) had previously taken an online college course (see Table 2). The level of education amongst these students included 168 at an associate's of science degree while 4 students had not earned a previous degree but were considered seniors by the university (see Table 3).

Table 2 Online Courses

Previous Online Course	Frequency (%)
Yes	163 (94.76%)
No	9 (5.24%)
Total	172

Table 3 Previous Degree

Type	Frequency (%)
Associate of Science/Associate of Applied Science (Core Certified)	168 (97.67%)
No degree earned	4 (2.33%)
Total	172

The mean cumulative GPA for the population before taking this course was 3.24. Cohort 1 (FA15) consisted of 57 students with a mean cumulative GPA of 3.19; Cohort 2 (SP16) consisted of 64 students with a mean cumulative GPA of 3.28; Cohort 3 (Summ16) consisted of 25 students with a mean cumulative GPA of 3.29; Cohort 4 (FA16) consisted of 26 students with a mean cumulative GPA of 3.18. The formative assessment cohorts (FA15, FA16) consisted of 83 students with a mean cumulative GPA of 3.185 while the summative assessment cohorts (SP16, Summ16) consisted of 89 students with a mean cumulative GPA of 3.285 (see Tables 4 & 5).

Table 4 **Cumulative GPA**

Cohort	Number of students	Mean GPA
Fall 2015	57	3.19
Spring 2016	64	3.28
Summer 2016	25	3.29
Fall 2016	26	3.18
Total	172	

Table 5 **Formative/Summative Cumulative GPA**

Cohort	Number of students	Mean GPA
Formative Total (FA15, FA16)	83	3.185
Summative Total (SP16, Summ16)	89	3.285
Total	172	

Results

Exploratory factor analysis was performed on the research data to ensure variance and reliability was of an appropriate level. Initial results indicated that the data was suitable for factor analysis with a Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) value greater than 0.6 (0.924, $p < .001$). The KMO test measures sampling adequacy for all variables included within a model, values of less than 0.6 are not suitable for exploratory factor analysis. The results of the rotated component matrix initially showed five common constructs but only three constructs showed a total variance cumulative percentage greater than 50%. The extraction was once again run using SPSS while limiting the components to three with the final model explaining 72.54% of the total variance. The survey questions were then grouped into the following specific

subsets in order to reflect the three constructs of Satisfaction, Connectedness and Learning (see Table 6).

Table 6 Overall Construct Reliability

Construct	Cronbach's Alpha
Satisfaction	.929
Connectedness	.822
Learning	.910

Satisfaction Variable

The variable of satisfaction was comprised of the following survey questions: Q8, Q10, Q11, Q12, Q13, Q14, Q23, Q24, Q25. Evaluating the internal reliability of this variable analysis was performed demonstrating a Cronbach's Alpha level of .929 which indicates a high level of reliability for this variable. A new variable which combined all of the questions together was then created to represent Total Satisfaction (*TotSat*). In order to ensure uniformity of scores amongst the total score variables each one was divided by the number of questions presented within for a total max score of five.

Descriptive statistics were performed on the new variable *TotSat* demonstrating a mean value for the formative cohort of 3.7966 (std. Dev= .86243) and for the summative cohort of 3.6622 (std. Dev= .76123) (see Table 7). After descriptives were run a one-way ANOVA was performed for *TotSat* as well as separating out the individual questions within *TotSat* to evaluate and interpret those results as well. The ANOVA analysis demonstrated that between the formative and summative cohorts scores for *TotSat* was not statistically significant $p = .394$ (see Table 8). The ANOVA results for the individual questions demonstrated that none of them were considered statistically significant between the formative and summative cohort (see Table 16). Although all nine questions

which made up the variable of *TotSat* were higher for the formative cohorts when compared to summative cohorts, although none rose to the level of statistical significance.

Table 7 Total Satisfaction Descriptives

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Summative	50	3.6622	.76123	.10765	3.4459	3.8786	1.78	5.00
Formative	59	3.7966	.86243	.11228	3.5719	4.0214	1.00	5.00
Total	109	3.7350	.81662	.07822	3.5799	3.8900	1.00	5.00

Table 8 ANOVA Total Satisfaction

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.489	1	.489	.731	.394
Within Groups	71.534	107	.669		
Total	72.022	108			

Connectedness Variable

The variable of connectedness was comprised of the following survey questions: Q1, Q2, Q3, Q4, Q5, Q9. Evaluating the internal reliability of this variable analysis was performed demonstrating a Cronbach's Alpha level of .822 which indicates a high level of reliability for this variable (see Table 6). A new variable which combined all of the questions together was then created to represent Total Connectedness (*TotConnect*). In order to ensure uniformity of scores amongst the total score variables each one was divided by the number of questions presented within for a total max score of five.

Descriptive statistics were performed on the new variable *TotConnect* demonstrating a mean value for the formative cohort of 3.5028 (std. Dev= .82785) and for the summative cohort of 3.22 (std. Dev= .71225) (see Table 9). After descriptives were run a one-way ANOVA was performed for *TotConnect* as well as separating out the individual questions within *TotConnect* to evaluate and interpret those results as well. The ANOVA analysis demonstrated that between the formative and summative cohorts scores for *TotConnect* was not statistically significant $p = .061$ (see Table 10). The ANOVA results for the individual questions demonstrated that two of the six questions were statistically significant demonstrating higher scores for the formative versus summative cohorts: Q2 (I felt more connected to my instructor in this course) $p = .012$ and Q3 (I felt more connected to others in this course) $p = .003$ (see Table 15).

Table 9 Total Connectedness Descriptives

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Summative	50	3.2200	.71225	.10073	3.0176	3.4224	1.17	5.00
Formative	59	3.5028	.82785	.10778	3.2871	3.7186	1.67	5.00
Total	109	3.3731	.78630	.07531	3.2238	3.5224	1.17	5.00

Table 10 ANOVA Total Connectedness

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.165	1	2.165	3.585	.061
Within Groups	64.607	107	.604		
Total	66.772	108			

Learning Variable

The variable of learning was comprised of the following survey questions: Q15, Q16, Q17, Q18, Q19, Q20, Q21, Q22, Q6, Q7. Evaluating the internal reliability of this variable analysis was performed demonstrating a Cronbach's Alpha level of .910 which indicates a high level of reliability for this variable (see Table 6). A new variable which combined all of the questions together was then created to represent Total Learning (*TotLearn*). In order to ensure uniformity of scores amongst the total score variables each one was divided by the number of questions presented within for a total max score of five.

Descriptive statistics were performed on the new variable *TotLearn* demonstrating a mean value for the formative cohort of 4.2203 (std. Dev= .60309) and for the summative cohort of 3.868 (std. Dev= .64252) (see Table 11). After descriptives were run a one-way ANOVA was performed for *TotLearn* as well as separating out the individual questions within *TotLearn* to evaluate and interpret those results as well. The ANOVA analysis demonstrated that between the formative and summative cohorts scores for *TotLearn* was statistically significant demonstrating higher scores for the formative versus summative cohorts ($p = .004$) (see Table 12). The ANOVA results for the individual questions demonstrated that five of the ten were statistically significant demonstrating higher scores for the formative versus summative cohorts: Q6 (I felt the instructor provided me with greater feedback that helped me to understand my strengths and weaknesses in this course) $p < .001$, Q7 (The instructor provided extensive feedback in a timely manner) $p < .001$, Q16 (I felt my educational needs were met) $p = .045$, Q20 (Reflection on course content and discussions helped me to understand fundamental

concepts in this course) $p = .045$, Q21 (The instructor clearly communicated important course topics) $p = .050$ (see Table 17).

Table 11 Total Learning Descriptives

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Summative	50	3.8680	.64252	.09087	3.6854	4.0506	2.50	5.00
Formative	59	4.2203	.60309	.07852	4.0632	4.3775	2.50	5.00
Total	109	4.0587	.64323	.06161	3.9366	4.1808	2.50	5.00

Table 12 ANOVA Total Learning

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.360	1	3.360	8.699	.004
Within Groups	41.324	107	.386		
Total	44.684	108			

Academic Performance Variable

Academic performance was defined as the final course grade earned as represented via percentage within the course evaluated. The total population for the formative assessment cohorts achieved a mean score of 87.55% ($n = 83$) while the total population for summative cohorts mean score was 84.1% ($n = 89$) (see Table 13). ANOVA results indicated that the differences between the two groups were statistically significant demonstrating higher scores for the formative versus summative cohorts ($p = .041$) (see Table 14). The 95% confidence interval for mean final score for the formative cohorts was 90.2218-84.8864 while the summative cohorts were 86.1549-82.0516.

Table 13 Academic Performance Descriptives

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean			
					Lower Bound	Upper Bound	Minimum Maximum	
Summative	89	84.1033	9.73935	1.03237	82.0516	86.1549	35.77	94.46
Formative	83	87.5541	12.21722	1.34101	84.8864	90.2218	38.25	100.00
Total	172	85.7685	11.10767	.84695	84.0967	87.4403	35.77	100.00

Table 14 ANOVA Academic Performance

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	511.433	1	511.433	4.223	.041
Within Groups	20586.592	170	121.098		
Total	21098.025	171			

Table 15 ANOVA Results Connectedness between Formative to Summative Cohorts

		Sum of Squares	df	Mean Square	F	Sig.
Q1: I felt less isolated in this course	Between Groups	.478	1	.478	.379	.539
	Within Groups	134.917	107	1.261		
	Total	135.394	108			
Q2: I felt more connected to my instructor in this course	Between Groups	8.142	1	8.142	6.469	.012
	Within Groups	134.666	107	1.259		
	Total	142.807	108			
Q3: I felt more connected to others in this course	Between Groups	8.663	1	8.663	9.217	.003
	Within Groups	100.566	107	.940		
	Total	109.229	108			
Q4: I felt more confident that others would support me in this course	Between Groups	1.375	1	1.375	1.579	.212
	Within Groups	93.212	107	.871		
	Total	94.587	108			
Q5: I have greater trust in my instructor in this course	Between Groups	2.529	1	2.529	2.529	.115
	Within Groups	106.017	106	1.000		
	Total	108.546	107			
	Between Groups	.010	1	.010	.007	.934

Q9: Assessment techniques used in this course helped to create a less stressful learning environment	Within Groups	161.256	107	1.507
	Total	161.266	108	

Table 16 ANOVA Results Satisfaction between Formative to Summative Cohorts

		Sum of Squares	df	Mean Square	F	Sig.
Q8: Assessment methods used in this course were unique but reasonable	Between Groups	.027	1	.027	.025	.875
	Within Groups	118.982	107	1.112		
	Total	119.009	108			
Q10: I achieved learning objectives more efficiently due to the assessment methods employed in this co...	Between Groups	.014	1	.014	.013	.910
	Within Groups	113.124	107	1.057		
	Total	113.138	108			
Q11: I was able to focus on learning course content versus “grades”, due to the assessment methods use...	Between Groups	1.882	1	1.882	1.369	.245
	Within Groups	147.127	107	1.375		
	Total	149.009	108			
Q12: I found the grade negotiation process to a be an interactive, value-added practice	Between Groups	.072	1	.072	.058	.811
	Within Groups	133.066	107	1.244		
	Total	133.138	108			
Q13: I felt that I was encouraged to ask questions	Between Groups	2.854	1	2.854	2.781	.098
	Within Groups	108.776	106	1.026		
	Total	111.630	107			
Q14: I felt more at ease in exposing gaps in my knowledge of course content	Between Groups	.428	1	.428	.463	.498
	Within Groups	98.966	107	.925		
	Total	99.394	108			
Q23: The course was effectively organized	Between Groups	.015	1	.015	.022	.883
	Within Groups	72.939	107	.682		
	Total	72.954	108			
Q24: I am satisfied with this course	Between Groups	1.897	1	1.897	2.207	.140
	Within Groups	91.956	107	.859		
	Total	93.853	108			

Q25: I would recommend this course to fellow students	Between Groups	.018	1	.018	.017	.898
	Within Groups	118.752	107	1.110		
	Total	118.771	108			

Table 17 ANOVA Results Learning between Formative to Summative Cohorts

		Sum of Squares	df	Mean Square	F	Sig.
Q6: The felt the instructor provided greater feedback that helped me to understand my strengths and w...	Between Groups	23.536	1	23.536	20.950	.000
	Within Groups	120.207	107	1.123		
	Total	143.743	108			
Q7: The instructor provided extensive feedback in a timely manner	Between Groups	18.003	1	18.003	14.616	.000
	Within Groups	131.795	107	1.232		
	Total	149.798	108			
Q15: I felt that I was given ample opportunities to learn	Between Groups	.433	1	.433	.683	.410
	Within Groups	67.769	107	.633		
	Total	68.202	108			
Q16: I felt my educational needs were met	Between Groups	2.884	1	2.884	4.116	.045
	Within Groups	74.969	107	.701		
	Total	77.853	108			
Q17: The instructor encouraged course participants to explore new concepts in this course	Between Groups	.456	1	.456	1.172	.281
	Within Groups	41.654	107	.389		
	Total	42.110	108			
Q18: I utilized a variety of informational sources to explore problems posed in this course	Between Groups	.272	1	.272	.590	.444
	Within Groups	49.416	107	.462		
	Total	49.688	108			
Q19: Learning activities helped me to construct stronger explanations/solutions in this course	Between Groups	2.056	1	2.056	3.101	.081
	Within Groups	70.935	107	.663		
	Total	72.991	108			
Q20: Reflection on course content and	Between Groups	2.541	1	2.541	4.106	.045
	Within Groups	66.229	107	.619		

discussions helped me to understand fundamental concepts in this...	Total	68.771	108			
Q21: The instructor clearly communicated important course topics	Between Groups	2.519	1	2.519	3.934	.050
	Within Groups	68.508	107	.640		
	Total	71.028	108			
Q22: The instructor clearly communicated important course goals	Between Groups	1.138	1	1.138	1.933	.167
	Within Groups	63.008	107	.589		
	Total	64.147	108			

Chapter Summary

The preceding chapter was a presentation of the results found after data analysis was performed during this quantitative research study. Topics included: the purpose of this research study; population/sample demographic and academic information; study reliability/validity results as well as statistical analysis results for the variables investigated. A discussion of the results found during data analysis for this study will be conducted in chapter five.

CHAPTER FIVE: DISCUSSION AND CONCLUSIONS

Introduction

The purpose of this study was to gain a greater understanding of the impact that formative in comparison to summative assessment has on student connectedness, satisfaction, learning and academic performance within a university online healthcare course. The following chapter will further extrapolate upon the analysis conducted in chapter four while identifying relationships between current literature and the findings of this study. Additionally, this chapter will include relevant information on limitations of this study, possible directions for research to be conducted in the future and the implications of the results discovered.

The research questions provided below in addition to the findings of this study will be used to help guide the discussion within this chapter:

1. What effects does formative in comparison to summative assessment practices used within a university healthcare online course have on student perceptions of connectedness to their peers, instructor and delivered course content?
2. What effects does formative in comparison to summative assessment practices used within a university healthcare online course have on student perceptions of overall course satisfaction?
3. What effects does formative in comparison to summative assessment practices used within a university healthcare online course have on student perceptions of their learning that occurred?

4. What effects does formative in comparison to summative assessment practices used within a university healthcare online course have on student academic performance as represented by final grade earned?

Demographics and Target Course

The demographics of the population that participated in this study was analogous to the population of similar 400-level online healthcare courses taught within the university. Female students made up a significantly higher percentage of the total population when compared to their male counterparts (62.8% vs 37.2%) as is common within healthcare fields of study (Reichenbach & Brown, 2004). The geographical locations of the study population was diverse, representing 34 states in addition to one international student. An evaluation of level of education earned within the population showed 168 students possessed an associate's of science/associates of applied science degree and four students classified as seniors with no previous degree earned. The high number of students having a previous degree was expected as the target course studied is a required within the Respiratory Care AS to BS Degree Advancement Program.

The target course used for this study was a 400 level three-credit fully online healthcare course which was housed within a university's Respiratory Care Department. The course was studied throughout four continuous semesters: Fall 15', Spring 16', Summer 16', Fall 16'. The study started with a formative assessment cohort in Fall 15' followed by a summative assessment cohort in Spring 16'. Enrollment records over the last nine years the course had previously been taught were then used in conjunction with active enrollment a week before the course started to select the next two cohorts in an effort to have equivalent sample sizes in both the formative and summative cohorts. The

formative cohorts were comprised of students enrolled in the Fall 15' (57 students), Fall 16'(26 students) semesters for a total of 83 students in the formative study population; a total of 59 of those students participated in this study. The summative cohorts were comprised of students enrolled in the Spring 16' (64 students), Summer 16' (25 students) semesters for a total of 89 students in the summative study population; a total of 50 of those students participated in this study.

Assessment and Student Outcomes

Enrollment in American colleges and universities is currently estimated to be over 20 million students clearly indicating that many individuals see a clear connection between higher education and increased opportunities post-graduation (Allen & Seaman, 2016). The popularity of higher education though has not been without its detractors with many pointing to decreasing enrollments over the past several years to illustrate systemic problems within higher education itself (Allen & Seaman, 2016). Further adding to the issues facing the higher education landscape has been the explosive rise of online education with all of its potential opportunities and issues. Supporters of online education are quick to discuss opportunities such as increased student enrollment not limited by student geographical location or the enrollment restraints of a physical classroom. While others report issues such as increased professional development needed for educators to effectively teach within the unique characteristics of an online environment and student retention which in some cases has been reported to be upwards of six times lower than similar courses taught face-to-face (Gazza & Hunker, 2014; Patterson & McFadden, 2009). The preponderance of research though has consistently shown that studies evaluating the characteristics between face-to-face and online education have “no

significant differences”, it is still vitally important to understand the predictors of student outcomes within a unique online educational environment (Nguyen, 2015).

Formative Assessment and Student Connectedness

Research Question: What effects does formative in comparison to summative assessment practices used within a university healthcare online course have on student perceptions of connectedness to their peers, instructor and delivered course content?

The concept of student connectedness in relation to this research was defined as a student’s feelings of connection to the course content, instructor and peers. The variable of *TotConnect* was created in order to combine six of the survey questions into one variable representing total connectedness. Internal reliability was ensured via a Cronbach’s Alpha level of .822. A one-way ANOVA was completed revealing the overall mean *TotConnect* score for the formative cohorts was higher than their summative counterparts (3.5028 vs 3.2200). The formative assessment *TotConnect* score in comparison to the summative score though did not raise to the level of significance ($p = .061$). A further breakdown of the survey questions included in the *TotConnect* variable though did indicated that two questions rose to the level of statistical significance. Question two demonstrated that students felt more connected to their instructor ($p = .012$), while question three showed a greater sense of connection to peers ($p = .003$) within the formative cohorts.

Although student’s in the formative cohorts clearly indicated a greater sense of connection to both instructor and peers; a connection to course content was lacking. A possible explanation as to why student’s felt a lack of connection to content within the formative cohorts might be explained by further examining the methods used within this

study. It was felt that in order to authentically create a formative assessment experience to clearly differentiate between summative assessment experiences, traditional awarding of summative grades intra-course was eliminated. Although extensive communication, feedback and learning aids were provided to the students ensuring that the awarding of final grades would be completed in a fair manner, many students simply could not overcome their discomfort with the process. Thus, in an attempt to create an authentic formative assessment experience this researcher underestimated participants familiarity, comfort and overwhelming desire to be awarded traditionally summative scores within the course. An indication of this can be seen in the results of question 9 of the survey: *Assessment techniques used in this course helped to create a less stressful learning environment?* Question 9 was the only question that did not demonstrate a higher total score for the formative versus summative cohorts ($p = .934$). Formative cohort students appear to have linked their connection to course content with their increased stress in not receiving traditional summative grades.

Exploring the literature between formative assessment practices and the concept of student connectedness is a difficult task as research in this area is lacking. What can be identified is the relationship between interaction in the form of teaching presence and level of connectedness a student experiences (Shea, Li & Pickett, 2006). In a study of 1067 students participating in fully online or “web-enhanced” college courses it was found that teaching presence was significantly connected to a students’ sense of learning community i.e. connectedness (Shea, Li & Pickett, 2006). It is therefore this author’s assertion that formative assessment practices lend themselves to increased intentional interaction, increased teaching presence and in turn an increase in student connectedness.

Formative Assessment and Student Satisfaction

Research Question: What effects does formative in comparison to summative assessment practices used within a university healthcare online course have on student perceptions of overall course satisfaction?

The variable of total student satisfaction (*TotSat*) was the product of combining nine of the survey questions together with an internal reliability via Cronbach's Alpha level of .929. The *TotSat* variable although not statistically significant, demonstrated a higher overall mean score for the formative cohorts (3.7966) in comparison to the summative cohorts (3.6622) ($p = .394$). A further breakdown of the *TotSat* variable demonstrated that all nine survey questions included for the formative cohorts consistently showed higher mean scores; although none reached statistical significance when compared to their summative counterparts.

Authentically measuring the variables which make up a student's sense of satisfaction within an online course of study can be a difficult task, although research has indicated assessment methodologies can play a key role. In an extensive review of the literature in regards to online formative assessment in higher education, Gikandi, Morrow & Davis (2011) found connections between formative practices and an increase in student satisfaction. Formative assessment practices have consistently been shown to have a powerful impact on student satisfaction, motivation and achievement (Cauley & McMillan, 2010). Educators can enhance a student's sense of satisfaction by employing formative assessment practices which help supplement the individual students' learning processes. Research has shown though that each student experiences assessment

differently, thus an individually tailored approach to each students' needs should be used when developing formative assessment practices (Gikandi, Morrow & Davis, 2011).

Formative Assessment and Student Learning

Research Question: What effects does formative in comparison to summative assessment practices used within a university healthcare online course have on student perceptions of their learning that occurred?

The variable of student learning (*TotLearn*) was the product of combining ten of the survey questions together which showed an internal reliability via a Cronbach's Alpha level of .910. The mean value for the formative cohorts equated to 4.2203 while the summative cohorts resulted in a value of 3.868. One-way ANOVA results demonstrated a statistically significant difference between the two assessment approaches ($p = .004$). A further breakdown of the questions included in *TotLearn* showed that five out of the ten questions were statistically significant between the groups and all questions demonstrated a higher value for the formative cohorts. Similar findings were reported by Velan et al, (2002) demonstrating a statistically significant relationship between online formative assessment practices amongst medical students and an increase in student learning.

Formative assessment is "Assessment FOR Learning" with its focus not limited to simply ranking students but rather helping students to achieve specified learning objectives (Stiggins, 2005). The approach is collaborative in nature in that students are actively involved in the assessment process, helping to isolate gaps in knowledge while indicating to instructors real-time interventions which could potentially help their learning process through the form of two-way formative feedback mechanisms. The

process of formative assessment therefore allows students to take greater ownership over their educational experience allowing for increased collaboration between student and educator. Weurlander et al., (2012) also demonstrated through their research a clear link between formative assessment and overall student learning. As Weurlander et al, (2012) concluded their findings “support the idea that formative assessment methods can act as tools for learning by affecting students; motivation to study and by making them aware of their own learning, thus contributing to their learning process” (p.758). Additionally, Furtak et al, (2016) also reported a connection between formative assessment practices and an increase in student learning.

Formative Assessment and Student Academic Performance

Research Question: What effects does formative in comparison to summative assessment practices used within a university healthcare online course have on student academic performance as represented by final grade earned?

Academic performance for the purposes of this quantitative study was defined as final course grade earned. The mean final course grade for the formative cohorts was 87.55% (n= 83) in comparison to the summative cohorts 84.1% (n= 89). One-way ANOVA results indicated that the formative assessment cohorts had statistically significantly higher academic performance in comparison to their summative counterparts ($p = .041$). The results of this study further align with research previously published on the relationship between healthcare students and the use of formative assessment practices. Mitra & Barua (2015) reported a small but statistically significant connection between formative assessment practices and academic performance within a healthcare course. Similar research such as that performed by Carrillo-de-la-Pena et al,

(2009) in a study of 548 healthcare students evaluating the impact of formative assessment found that those who participated in formative assessment scored significantly higher on subsequent summative assessments. Additionally, it was found that participation in formative assessment was a greater predictor of final course outcomes than past academic performance (Carrillo-de-la-Peña et al., 2009).

Maintaining equipoise in regards to academic performance between the treatment groups was of utmost importance to this research study. A three-pronged approach was undertaken to ensure that one assessment group did not have a significant advantage over the other group. First, the content used within the rubrics for the three main assignments (discussion board postings, essay, final video project) were identical for both groups. The only variation between the sets of rubrics was the differentiation listed at the top separating the different levels of meeting expectations for said assignment. Four levels were present in both sets of rubrics. The formative rubrics possessed: superior, proficient, basic and below expectations; whereas the summative rubrics contained: A(89.5-100%), B(79.5-89.4%), C(69.5-79.4%), D-F(<69.5%). Students in both treatment groups at the completion of an assignment were presented with a personalized rubric which highlighted each section achieved. The groups did differ though in what was delivered within gradebook which they were able to visualize. Summative cohorts were able to actually see a specific percentage earned while formative cohorts were presented with a letter corresponding to their level of achievement (S= Superior, P= Proficient, B=Basic, BE= Below Expectations).

Second, the instructor gradebook which was not available for formative students to view possessed the actual percentage earned to ensure academic performance was

calculated the same for both treatment groups. Differences did exist though in the type of feedback delivered between the groups. Summative cohorts received no preconstructed audio feedback which corresponded to the assignments. Formative assessment students though were given audio feedback which reiterated the specific corresponding level within the rubric their assignment had been assessed at; in conjunction with a request to contact the instructor within any ways the presentation of information could be improved upon by the instructor for said student.

Lastly, in an attempt to provide an even playing field for the two treatment groups assignment requirements, discussion board prompts, instructor announcements and all other course documents were kept the same across all cohorts. The only variation in this procedure was a modification of the course syllabi for the formative cohorts to help explain and gain buy-in for the type of instructor assessment which would occur. Additionally, a five-minute introductory presentation accompanied the start of the formative sections in order to help further explain how assessment would be conducted within the course. The findings of this research study demonstrating a statistically significant relationship between formative assessment practices and academic performance are in-line with past research performed (Carrillo-de-la-Peña et al., 2009; Mitra & Barua, 2015).

Summary

This quantitative research study clearly demonstrates that formative assessment practices significantly increase online healthcare student's sense of learning and academic performance. Survey results showed that mean values for the formative cohorts were higher in 24 out of 25 questions when compared to the summative cohorts. Question

nine (*Assessment techniques used in this course helped to create a less stressful learning environment*) was the only response that indicated a higher mean value for the summative cohorts (3.24) in contrast to the formative cohorts (3.22).

Out of the 24 questions, seven reached the level of statistical significance:

Question two (*I felt more connect to my instructor in this course*); question three (*I felt more connect to others in this course*); question six (*I felt the instructor provided greater feedback that helped me to understand my strengths and weaknesses, relative to the course's goals and objectives*); question seven (*The instructor provided extensive feedback in a timely manner*); question sixteen (*I felt my educational needs were met*); question twenty (*Reflection on course content and discussions helped me to understand fundamental concepts in this class*); and question twenty-one (*The instructor clearly communicated important course topics*). Additionally, the difference in academic performance as represented by mean final course grade earned was statistically significant with a higher mean for the formative cohorts (87.55%) in contrast to (84.1%) for the summative cohorts ($p = .041$). Although both students' sense of connectedness and satisfaction failed to reach statistical significance both student outcomes were higher for formative versus summative cohorts.

Implications of the Results

This quantitative study found that formative assessment practices significantly affected the student outcomes of learning and academic performance. While student connectedness and satisfaction outcomes measured were not statistically significant, in each case values measured were higher for the formative cohorts when compared to summative cohorts. The implications of the results of this study can further be realized by

understanding that many of the problems facing both healthcare education and online education are affected by the same student outcomes that were measured in this study. The results present a unique opportunity for not only educators but departments, colleges and universities as a whole to address current challenges.

While research conducted on online versus F2F education has consistently shown “no significant difference”, differences exist when measuring persistence/retention between the delivery platforms (Patterson & McFadden, 2009). Online education has been shown to have issues as students are more likely to persist within a course of study and be retained to graduation within F2F courses. While many factors effect a student’s willingness to persist, increasing a student’s sense of connectedness, satisfaction, learning and academic performance has been shown to increase the likelihood of persistence/retention (Hart, 2012). Taking the results of this study then a step further by understanding the connection between formative assessment and the student outcomes which effect persistence/retention the potential benefits are far reaching. Many factors that potentially effect student retention such as demographics, work requirements and family obligations are difficult if not impossible for an educational institution to change but assessment practices can be changed (Hart, 2012). Educator professional development training which focuses on formative assessment practices can be created and mandated not just as a way to keep up with “best practices” but as an intentional effort increase the student outcomes presented and thus persistence/retention of online students.

While the development of self-regulated and lifelong learners is an important aspect to many educational fields it is vital to healthcare education (Wang, Shannon &

Ross, 2013). The rapidly evolving nature of healthcare worldwide requires healthcare practitioners to vigilantly stay abreast of constantly changing professional practices. Vast continuing education requirements throughout a healthcare professional's career dictate that those with greater self-regulatory and lifelong learning skillsets are much more likely to succeed. These skillsets though do not simply magically appear upon graduation but rather are honed, emphasized and encouraged throughout a students' educational journey. Teaching students to become self-regulated lifelong learners is a challenging task though for educators as it can be difficult to pinpoint content which will result in the desired outcome for each individual student. What is less difficult to understand are the student outcomes which have been shown to influence the potential a student will develop into a self-regulated learner. Research has shown that students who report higher levels of connectedness, satisfaction, learning and academic performance are more likely to develop self-regulated habits and to become lifelong learners (Wang, Shannon & Ross, 2013). The potential benefits of authentic formative assessment practices by online healthcare educators should therefore not be overlooked by academic departments as a way to encourage the development of lifelong learners.

The findings of the study presented here can help serve to direct departmental, college and university resources towards increasing formative assessment practices amongst online educators. Online healthcare education faces many unique challenges that will need to be addressed as continued growth occurs. Formative assessment practices are uniquely positioned to help meet those challenges as they are trainable amongst educators and can significantly affect student outcomes. As universities continue to look for ways to improve the student experience while increasing retention in a progressively

competitive marketplace, formative assessment practices have untapped potential to help meet those goals.

Limitations

The quantitative study presented is potentially limited in authentically answering the research questions created in that qualitative aspects of the student experience are not included. Although two qualitative questions were included in the survey, they along with other student factors such as demographic information specific to the sample and past academic performance within individual courses are not included in this study. The exclusion of these variables could prove to be a limitation in presenting the complete picture that the role of formative assessment has in regards to the student experience.

The course being used to evaluate student outcomes in relation to formative assessment methods used while maintaining as much consistency as possible is slightly adjusted on a semester to semester basis in response to student evaluations in order to improve the course. Changing the course over time to improve upon the student experience may affect the results of this study. Further, students enrolled in this course are primarily working healthcare professionals thus commonly having to maintain fulltime employment which could limit generalizability to more “traditional” students. Research has shown that “nontraditional” students’ outside commitments such as these can affect a student’s satisfaction, time required to connect with fellow classmates and academic performance (Scott & Lewis, 2011).

An additional limitation to this study is a lack of information regarding the demographic details of the sample participants involved. It was felt that by not asking participants personal demographic information such as race, gender, employment, level

of degree obtained, participants would feel more anonymous and thus have a greater likelihood of completing the entire survey. Demographic information was therefore obtained on the entire study population through the evaluation of official student transcripts to indicate gender, previous degree obtained, cumulative GPA and location. Generalizability of the findings may also be lacking considering the course provided is specific to Respiratory Care majoring students only.

Recommendations for Future Research

The quantitative research study presented within this dissertation provides solely one form of data which can be quantified and analyzed for statistical significance, additional qualitative information further expounding upon the student experience would be beneficial. This study also lacked demographic information which was specific to the sample being studied which would be useful in future research. The participants of this study were students whom would commonly be classified as “nontraditional” students research performed on students deemed as more “traditional” would help to broaden the generalizability of this study’s results. The majority of online students within a general university setting are classified as traditional thus including more of this type of student would potentially provide greater benefit to universities as a whole.

Future research would benefit from simplifying the methodologies used within the study presented here. For example, in an attempt to create an authentic formative assessment experience, this study removed the awarding of traditionally summative grades for formative cohorts a decision which potentially convoluted the results. Additional research could be performed which evaluates student outcomes when exposed to authentic formative assessment practices while summative grades are still awarded.

Students would then potentially benefit from these assessment methods without a disruption to their desire to be assessed in a familiar manner. Lastly, research which focuses on the role that professional development plays in improving an educators' ability to authentically perform formative assessment and potential changes in student outcomes subsequent to professional development training, would prove beneficial to institutions of higher learning.

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APPENDIX A

Surveys Used in the Creation of the Final Survey Assessment Tool

Online Student Connectedness Survey (OSCS)

Comfort

1. I feel comfortable in the online learning environment provided by my program.
2. I feel my instructors have created a safe online environment in which I can freely express myself.
3. I feel comfortable asking other students in online courses for help.
4. I feel comfortable expressing my opinions and feelings in online courses.
5. I feel comfortable introducing myself in online courses.
6. If I need to, I will ask for help from my classmates.
7. I have no difficulties with expressing my thoughts in my online courses.
8. I can effectively communicate in online courses.

Community

1. I have gotten to know some of the faculty members and classmates well.
2. I feel emotionally attached to other students in my online courses.
3. I can easily make acquaintances in my online courses.
4. I spend a lot of time with my online course peers.
5. My peers have gotten to know me quite well in my online courses.
6. I feel that students in my online courses depend on me.

Facilitation

1. Instructors promote collaboration between students in my online courses.
2. Instructors integrate collaboration tools (e.g., chat rooms, wikis, and group areas) into online course activities.
3. My online instructors are responsive to my questions.
4. I receive frequent feedback from my online instructors.
5. My instructors participate in online discussions.
6. In my online courses, instructors promote interaction between learners.

Interaction and Collaboration

1. I work with others in my online courses.
2. I relate my work to others' work in my online courses.
3. I share information with other students in my online courses.
4. I discuss my ideas with other students in my online courses.
5. I collaborate with other students in my online courses.

Community of Inquiry Survey Instrument

Teaching Presence

Design & Organization

1. The instructor clearly communicated important course topics.
2. The instructor clearly communicated important course goals.
3. The instructor provided clear instructions on how to participate in course learning activities.
4. The instructor clearly communicated important due dates/time frames for learning activities.

Facilitation

5. The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.
6. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.
7. The instructor helped to keep course participants engaged and participating in productive dialogue.
8. The instructor helped keep the course participants on task in a way that helped me to learn.
9. The instructor encouraged course participants to explore new concepts in this course.
10. Instructor actions reinforced the development of a sense of community among course participants.

Direct Instruction

11. The instructor helped to focus discussion on relevant issues in a way that helped me to learn.
12. The instructor provided feedback that helped me understand my strengths and weaknesses relative to the course's goals and objectives.
13. The instructor provided feedback in a timely fashion.

Social Presence

Affective expression

14. Getting to know other course participants gave me a sense of belonging in the course.

15. I was able to form distinct impressions of some course participants.
16. Online or web-based communication is an excellent medium for social interaction.

Open communication

17. I felt comfortable conversing through the online medium.
18. I felt comfortable participating in the course discussions.
19. I felt comfortable interacting with other course participants.

Group cohesion

20. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.
21. I felt that my point of view was acknowledged by other course participants.
22. Online discussions help me to develop a sense of collaboration.

Cognitive Presence

Triggering event

23. Problems posed increased my interest in course issues.
24. Course activities piqued my curiosity.
25. I felt motivated to explore content related questions.

Exploration

26. I utilized a variety of information sources to explore problems posed in this course.
27. Brainstorming and finding relevant information helped me resolve content related questions.
28. Online discussions were valuable in helping me appreciate different perspectives.

Integration

29. Combining new information helped me answer questions raised in course activities.
30. Learning activities helped me construct explanations/solutions.
31. Reflection on course content and discussions helped me understand fundamental concepts in this class.

Resolution

32. I can describe ways to test and apply the knowledge created in this course.
33. I have developed solutions to course problems that can be applied in practice.
34. I can apply the knowledge created in this course to my work or other non-class related activities.

5 point Likert-type scale

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

Classroom Community Scale

1. I feel that students in this course care about each other
(SA) (A) (N) (D) (SD)
2. I feel that I am encouraged to ask questions
(SA) (A) (N) (D) (SD)
3. I feel connected to others in this course
(SA) (A) (N) (D) (SD)
4. I feel that it is hard to get help when I have a question
(SA) (A) (N) (D) (SD)
5. I do not feel a spirit of community
(SA) (A) (N) (D) (SD)
6. I feel that I receive timely feedback
(SA) (A) (N) (D) (SD)
7. I feel that this course is like a family
(SA) (A) (N) (D) (SD)
8. I feel uneasy exposing gaps in my understanding
(SA) (A) (N) (D) (SD)
9. I feel isolated in this course (SA) (A) (N) (D) (SD)
10. I feel reluctant to speak openly (SA) (A) (N) (D) (SD)
11. I trust others in this course (SA) (A) (N) (D) (SD)
12. I feel that this course results in only modest learning
(SA) (A) (N) (D) (SD)
13. I feel that I can rely on others in this course
(SA) (A) (N) (D) (SD)
14. I feel that other students do not help me learn
(SA) (A) (N) (D) (SD)
15. I feel that members of this course depend on me

(SA) (A) (N) (D) (SD)

16. I feel that I am given ample opportunities to learn

(SA) (A) (N) (D) (SD)

17. I feel uncertain about others in this course

(SA) (A) (N) (D) (SD)

18. I feel that my educational needs are not being met

(SA) (A) (N) (D) (SD)

19. I feel confident that others will support me

(SA) (A) (N) (D) (SD)

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

(SA) (A) (N) (D) (SD)

APPENDIX B

Final Student Outcomes Survey

Q1 I felt less isolated in this course

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q2 I felt more connected to my instructor in this course

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q3 I felt more connected to others in this course

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q4 I felt more confident that others would support me in this course

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q5 I have greater trust in my instructor in this course

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q6 I felt the instructor provided greater feedback that helped me to understand my strengths and weaknesses, relative to the course's goals and objectives

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q7 The instructor provided extensive feedback in a timely manner

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q8 Assessment methods used in this course were unique but reasonable

- Strongly Disagree (1)
- Disagree (2)

- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q9 Assessment techniques used in this course helped to create a less stressful learning environment

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q10 I achieved learning objectives more efficiently due to the assessment methods employed in this course

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q11 I was able to focus on learning course content versus “grades”, due to the assessment methods used in this course

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q12 I found the grade negotiation process to be an interactive, value-added practice

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q13 I felt that I was encouraged to ask questions

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q14 I felt more at ease in exposing gaps in my knowledge of course content

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q15 I felt that I was given ample opportunities to learn

- Strongly Disagree (1)
- Disagree (2)

- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q16 I felt my educational needs were met

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q17 The instructor encouraged course participants to explore new concepts in this course

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q18 I utilized a variety of informational sources to explore problems posed in this course

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q19 Learning activities helped me to construct stronger explanations/solutions in this course

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q20 Reflection on course content and discussions helped me to understand fundamental concepts in this class

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q21 The instructor clearly communicated important course topics

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q22 The instructor clearly communicated important course goals

- Strongly Disagree (1)
- Disagree (2)

- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q23 The course was effectively organized

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q24 I am satisfied with this course

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q25 I would recommend this course to fellow students

- Strongly Disagree (1)
- Disagree (2)
- Neither Agree nor Disagree (3)
- Agree (4)
- Strongly Agree (5)

Q26 What are the major strengths of this course?

Q27 What are the major weaknesses of this course?

APPENDIX C

Rubrics Used for Formative & Summative Cohorts

Formative Cohorts Discussion Board

Discussion Board Rubric	Superior	Proficient	Basic	Below Expectations
Initial Posting Length (words)	400 (+/-25)	300 (+/-25)	200 (+/-25)	< 150
Utilization of appropriate citation (APA)	Frequently cites relevant external sources that add to the discussion and demonstrates additional topic exploration.	External sources outside of the textbook are occasionally cited in a relevant manner.	Most citations consist of the required textbook with few outside sources cited.	Citations only include the textbook if any at all.
Basic Mechanics	No obvious grammatical errors or stylistic issues.	1-2 minimal grammatical errors or stylistic issues.	3-4 grammatical errors or stylistic issues that do not affect the flow of the posting.	Numerous grammatical errors that affect the ease at which an individual can read the posting.
Frequency	Student provides substantial follow up posts (150+/-25 wrds) at least four times/wk.	Student provides substantial follow up posts (150+/-25 wrds) at least three times/wk.	Student provides substantial follow up posts (150+/-25 wrds) at least two times/wk.	Student provides substantial follow up posts (150+/-25 wrds) < two times/wk.
Timeliness	Initial posting is provided on/before Wednesday the week it is due; follow-up postings are completed by Saturday.	Initial posting is provided on/before Wednesday the week it is due; follow-up postings are completed by Sunday.	Initial posting is provided after Wednesday the week it is due; follow-up postings are completed by Saturday/Sunday	All student posts are within the same time window or late in the week (Days 6-7), not allowing others appropriate time to respond to their postings
Engagement with content; adding to the class	Provides insightful, original postings which bring new understanding (external sources) to the topics at hand. Posting could be used as	Creates postings which take the conversation into new relevant directions, along with re-affirming concepts previously discovered.	Delivers relevant postings which demonstrate a solid grasp of the textbook material, along with helping to continue the overall class conversation.	Offers little evidence of understanding reading assignments and provides no substantive effort to help others to

	an example for the class			understand the material assigned.
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Formative Cohorts Essay Rubric

Essay Rubric	Superior	Proficient	Basic	Below Expectations
Length (words)	600 (+/-25)	500 (+/-25)	400 (+/-25)	< 300
Utilization of appropriately (APA) utilized references	Expertly cites (summarization, no lengthy quotes) relevant external sources when needed and not just for the sake of providing “external sources”.	Cites (summarization, no lengthy quotes) the textbook and other provided sources when needed.	Cites (summarization, no lengthy quotes) the textbook when needed, although mostly relates the question to personal experiences.	The textbook is not cited and personal examples are not used in order to answer the question. Lengthy unnecessary quotes are present.
Basic Mechanics	No obvious grammatical or stylistic errors.	1-2 minimal grammatical errors or stylistic issues.	3-4 grammatical errors or stylistic issues that do not affect the flow of the short essay.	Numerous grammatical errors that effect the ease at which an individual can read the essay.
Quality of Answers Provided	Provides an insightful, original and relevant essay which brings new, previously unknown knowledge to the question at hand.	Creates a unique essay which provides a strong relevant viewpoint, along with re-affirming concepts previously discovered in the course.	Delivers a relevant essay which demonstrates a solid grasp of the textbook material covered within the course.	Offers little evidence of understanding reading assignments or the question presented.

Structure of Essay	Provides a strong introduction which grabs readers' attention, utilizes innovative supporting paragraphs, conclusion demonstrates a strong answer to the question posed.	Student provides a strong introduction but lacks attention grabbing component, uses supporting paragraphs with personal examples, conclusion is provided but is lacking in ability to tie the essay together.	Average/basic introduction with little focus on thesis statement, supporting paragraphs are present though lack personal examples or evidence, conclusion is present but does not fully engage the reader.	Essay lacks any real structure, flow, evidence, personal examples or ability to engage the reader.
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Formative Cohorts Video Project Rubric

Video Rubric	Superior	Proficient	Basic	Below Expectations
Length (min)	≤7(S)≤8	≤6(P)≤7	≤5(B)≤6	(BE)<5
Supporting your position with appropriately cited (APA) references	Utilizes relevant external sources that support stated claims while demonstrating advanced topic exploration.	Additional sources outside of the textbook that were provided by the instructor are used but do not demonstrate further topic exploration.	Student cites textbook when necessary, although no other sources or supporting materials are referenced.	The textbook and/or outside sources are infrequently if ever cited in order to support the student's position.
Quality of knowledge displayed	Provides insightful, original and relevant information which demonstrates an advanced understanding of the topic/question at hand.	Response takes a strong relevant position, while providing personal examples and re-affirming concepts previously discovered.	Knowledge displayed demonstrates a basic understanding of the textbook material presented in the course.	Student response provided does little to demonstrate an understanding of the materials presented in this course.

Voice & Mechanics	Clear pronunciation of relevant words without speaking too fast/slow, uses appropriate: eye contact, body gestures and is dressed professionally. Previous practice is evident.	Clear pronunciation though occasionally too fast/slow, appropriate use of body mechanics is at times less than optimal.	Pronunciation is at times less than desirable, speed of presentation appears unpolished, and body mechanics has occasional issues (reading directly off of cards/computer).	Student lacks the ability to present their response, appears to fumble/mumble throughout the presentation, many incidences of less than optimal body mechanics.
Presentation quality	An innovative exciting presentation which grabs the viewers' attention through the use of digital effects/ media in order to augment without taking away from content.	Solid use of digital effects and media, although doesn't really grab the viewers' attention.	Use of digital effects/media are present but do not grab the viewers' attention and at times seem to be forced into the presentation.	Presentation lacks the use of any real digital enhancements and if they are present, they are inappropriately provided.

Summative Cohorts Discussion Board Rubric

Discussion Board Rubric (25pts/wk)	A (89.5-100%)	B (79.5-89.4%)	C (69.5-79.4%)	D-F (<69.5%)
Initial Posting Length (words)	400 (+/-25)	300 (+/-25)	200 (+/-25)	< 150
Utilization of appropriate citation (APA)	Frequently cites relevant external sources that add to the discussion and demonstrates additional topic exploration.	External sources outside of the textbook are occasionally cited in a relevant manner.	Most citations consist of the required textbook with few outside sources cited.	Citations only include the textbook if any at all.
Basic Mechanics	No obvious grammatical errors or stylistic issues.	1-2 minimal grammatical errors or stylistic issues.	3-4 grammatical errors or stylistic issues that do not affect the flow of the posting.	Numerous grammatical errors that affect the ease at which an individual can read the posting.

Frequency	Student provides substantial follow up posts (150+/- 25 wrds) at least four times/wk.	Student provides substantial follow up posts (150+/- 25 wrds) at least three times/wk.	Student provides substantial follow up posts (150+/- 25 wrds) at least two times/wk.	Student provides substantial follow up posts (150+/- 25 wrds) < two times/wk.
Timeliness	Initial posting is provided on/before Wednesday the week it is due; follow-up postings are completed by Saturday.	Initial posting is provided on/before Wednesday the week it is due; follow-up postings are completed by Sunday.	Initial posting is provided after Wednesday the week it is due; follow-up postings are completed by Saturday/Sunday	All student posts are within the same time window or late in the week (Days 6-7), not allowing others appropriate time to respond to their postings
Engagement with content; adding to the class	Provides insightful, original postings which bring new understanding (external sources) to the topics at hand. Posting could be used as an example for the class	Creates postings which take the conversation into new relevant directions, along with re-affirming concepts previously discovered.	Delivers relevant postings which demonstrate a solid grasp of the textbook material, along with helping to continue the overall class conversation.	Offers little evidence of understanding reading assignments and provides no substantive effort to help others to understand the material assigned.

Summative Cohorts Essay Rubric

Essay Rubric (50pts)	A (89.5-100%)	B (79.5-89.4%)	C (69.5-79.4%)	D-F (<69.5%)
Length (words)	600 (+/-25)	500 (+/-25)	400 (+/-25)	< 300
Utilization of appropriately (APA) utilized references	Expertly cites (summarization, no lengthy quotes) relevant external sources when needed and not just for the sake of providing "external sources".	Cites (summarization, no lengthy quotes) the textbook and other provided sources when needed.	Cites (summarization, no lengthy quotes) the textbook when needed, although mostly relates the question to personal experiences.	The textbook is not cited and personal examples are not used in order to answer the question. Lengthy unnecessary quotes are present.
Basic Mechanics	No obvious grammatical or stylistic errors.	1-2 minimal grammatical errors or stylistic issues.	3-4 grammatical errors or stylistic issues that do not affect the	Numerous grammatical errors that effect the ease at which

			flow of the short essay.	an individual can read the essay.
Quality of Answers Provided	Provides an insightful, original and relevant essay which brings new, previously unknown knowledge to the question at hand.	Creates a unique essay which provides a strong relevant viewpoint, along with re-affirming concepts previously discovered in the course.	Delivers a relevant essay which demonstrates a solid grasp of the textbook material covered within the course.	Offers little evidence of understanding reading assignments or the question presented.
Structure of Essay	Provides a strong introduction which grabs readers' attention, utilizes innovative supporting paragraphs, conclusion demonstrates a strong answer to the question posed.	Student provides a strong introduction but lacks attention grabbing component, uses supporting paragraphs with personal examples, conclusion is provided but is lacking in ability to tie the essay together.	Average/basic introduction with little focus on thesis statement, supporting paragraphs are present though lack personal examples or evidence, conclusion is present but does not fully engage the reader.	Essay lacks any real structure, flow, evidence, personal examples or ability to engage the reader.

Summative Cohorts Video Project Rubric

Video Rubric (100pts)	A (89.5-100%)	B (79.5-89.4%)	C (69.5-79.4%)	D-F (<69.5%)
Length (min)	≤7(S)≤8	≤6(P)≤7	≤5(B)≤6	(BE)<5
Supporting your position with appropriately cited (APA) references	Utilizes relevant external sources that support stated claims while demonstrating advanced topic exploration.	Additional sources outside of the textbook that were provided by the instructor are used but do not demonstrate further topic exploration.	Student cites textbook when necessary, although no other sources or supporting materials are referenced.	The textbook and/or outside sources are infrequently if ever cited in order to support the student's position.

Quality of knowledge displayed	Provides insightful, original and relevant information which demonstrates an advanced understanding of the topic/question at hand.	Response takes a strong relevant position, while providing personal examples and re-affirming concepts previously discovered.	Knowledge displayed demonstrates a basic understanding of the textbook material presented in the course.	Student response provided does little to demonstrate an understanding of the materials presented in this course.
Voice & Mechanics	Clear pronunciation of relevant words without speaking too fast/slow, uses appropriate: eye contact, body gestures and is dressed professionally. Previous practice is evident.	Clear pronunciation though occasionally too fast/slow, appropriate use of body mechanics is at times less than optimal.	Pronunciation is at times less than desirable, speed of presentation appears unpolished, and body mechanics has occasional issues (reading directly off of cards/computer).	Student lacks the ability to present their response, appears to fumble/mumble throughout the presentation, many incidences of less than optimal body mechanics.
Presentation quality	An innovative exciting presentation which grabs the viewers' attention through the use of digital effects/ media in order to augment without taking away from content.	Solid use of digital effects and media, although doesn't really grab the viewers' attention.	Use of digital effects/media are present but do not grab the viewers' attention and at times seem to be forced into the presentation.	Presentation lacks the use of any real digital enhancements and if they are present, they are inappropriately provided.

APPENDIX D

IRB Approval Protocol Number

This research was conducted under approval from the Institutional Review Board at Boise State University, protocol #(190-SB15-155).