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Student-Centered Approach Vs. Teacher-Centered Approach: Which Is More Effective For A Graduate Data Analytics Course In An E-Learning Environment?

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STUDENT-CENTERED APPROACH VS. TEACHER-CENTERED APPROACH:
WHICH IS MORE EFFECTIVE FOR A GRADUATE DATA ANALYTICS
COURSE IN AN E-LEARNING ENVIRONMENT?

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ABSTRACT

This action research study explored and tested the effectiveness of using student-centered methodology within an e-learning environment for a graduate level class in data analytics at Southern New Hampshire University to enhance students' scholastic abilities. The term *scholastic abilities* refers to the students' capabilities to apply to their personal world what is being taught. Inductive teaching and learning was used in this study and the student participants were assessed on their discussion posts and final projects. The primary question in this action research was: "How, if at all, can student-centered instruction increase achievement of students within a graduate level data analytics course in an e-learning environment?" The literature reviewed supports higher educational environments that enable graduate students to make connections between curricular content and their lived world experiences. Data collection included student achievement and student surveys. The data was analyzed using quantitative and qualitative methods. The major findings from the quantitative and qualitative methods of research indicate that students in the student-centered graduate analytics e-learning environment achieved higher scores and had a more positive experience than the students in the teacher-centered graduate analytics e-learning environment.

TABLE OF CONTENTS

iv

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Statement of the Problem of Practice

Southern New Hampshire University is in the process of creating effective e-learning environments. Surveys of instruction collected through the university evaluation site and student achievement data provide evidence that students are disengaged in the graduate program in data analytics, and this disengagement is exacerbated by traditional, top-down approaches to instruction. This action research study explored and tested the effectiveness of using student-centered methodology within an e-learning environment for a graduate level class in data analytics to enhance students' abilities. The term *abilities* refers to the students' capabilities to apply to their personal world what is being taught. By using student-centered instruction, students should be able to apply the methods more easily as they can relate the theories/concepts to their lives. "Student-centered teaching methods shift the focus of activity from the teacher to the learners. These methods include active learning, in which students solve problems, answer questions, formulate questions of their own, discuss, explain, debate, or brainstorm" (Oakley et al., 2004, p. 11). Student-centered classrooms recognize that a student shifts through stages and are designed to cultivate true interests. Educators should create an atmosphere advantageous to learning and encourage the development of students' learning experiences.

1

1.2 Significance of the Problem of Practice

Graduate students in the data analytics program at Southern New Hampshire University who receive teacher-centered instruction remain unlikely to attend lectures, take exams, and complete assignments that are not related to their interests. Students should want to learn and not become inactive or resistant, indifferent learners. Unfortunately, "as long as we make all the instructional decisions, learning remains ours and not our students" (McWhorter & Hudson-Ross, 1996, p. 15). Administrators have received complaints from teachers that students have not been attending live online lectures at an increasing rate of 5% per year over the past three years (Foss, 2017). Teachers and administrators believe it is a content issue based on feedback provided by students. Administrators have mentioned in meetings that they believe that students can attend live lectures online because other programs within Southern New Hampshire University have no attendance issues.

1.3 Theoretical and Conceptual Frameworks

This action research study concentrated on the effectiveness of using student-centered instruction to maximize the engagement of students within an e-learning environment. Educators need to have a strong understanding of how students learn and provide them with an environment that is favorable to their learning. From an intellectual standpoint, educators must be able to make important connections between content/theories and the students' lived world.

At the university, graduate students in the current Foundations of Data Analytics course are evaluated using definition-based discussion boards and a definition-based multiple-choice final exam. The discussion board and final exam do not have questions

2

related to real-world situations in which graduate students can apply the course concepts. Noddings (2013) mentions that "we cannot design a set of lessons on "team membership" and expect that, at its conclusion, everyone will pass a test on teamwork. Instead, we have to ask how our selection of topics and teaching methods may contribute to the development of these attitudes and skills" (p.402). Noddings (2013) then states that memorization and preparation for tests are not likely to prepare students for their lived world and that the development of students should be solely focused on "real-life meaning."

McWhorter and Hudson-Ross (1996) mention that "when teachers establish a need to know the information, students are then motivated to achieve the task set before them. Students need to be able to connect classroom learning to the outside world in which they live; therefore, providing students with a range of choices—in activities, reading material, and subject matter—is the key to developing a more personally meaningful learning experience" (pp. 14-15).

McWhorter and Hudson-Ross (1996) believe that students should be involved in making instructional decisions, but if not learning remains ours—not our students. Fink (2003) agrees with McWhorter and Hudson-Ross. Fink (2003) states that:

The key to quality educational programs is for the teachers to change from presenters of information to facilitators of significant learning experiences. Being a good facilitator is much harder and much more time consuming than being a good presenter of information; without considerable support at the institutional level, or significant individual motivation, change won't come easy since faculty

3

(like everybody else) will tend to optimize as best they can their scarce resources of time (p. 152).

Educators of graduate students are identifying the significance of students taking ownership for their learning. I believe there are many educators of graduate students who alter the method by which they are developing, planning, teaching, and evaluating curriculum and instruction. Student-centered instruction is not a new concept; in fact, it has been in existence since the 1960s. Unfortunately, it has taken a while for educators of graduate students to accept this concept. McWhorter and Hudson-Ross (1996) mention that concentrating on individual student learning is an approach to link supportive instruction, performance assessment, and constructivism. McWhorter and Hudson-Ross (1996) also state the benefits of student-centered instruction, e.g., reducing competition among students and encouraging students to work in teams.

Rousseau (1755), a French Enlightenment philosopher with strong pre-romantic tendencies, believed that the proper method of teaching should be centered on the idea that the teacher "teaches by doing whenever he or she can and only falls back upon words when doing it is out of the question" (p. 10). He believed the student should take part in educational activities and learn in a more "natural" way. Learning in a more natural way allows students to create original thoughts. "Natural," according to Rousseau, is directed by the laws of his own nature rather than those of social institutions. Rousseau (1755) believed people would have been happier if he had been allowed to remain in his natural state.

Central to this was the idea that it was possible to preserve the 'original perfect nature' of the child, by means of the careful control of his education and

4

environment, based on an analysis of the different physical and psychological stages through which he passed from birth to maturity" (p. 36).

This was a significant point. Rousseau argued that the momentum for learning was provided by the growth of the person and that the educator needed to facilitate opportunities for learning.

Bartolome (2003) states that "the actual strengths of teaching methods depend, first and foremost, on the degree to which they embrace a humanizing pedagogy that values the students' background knowledge, culture, and life experiences and creates learning contexts where power is shared by students and teachers" (p. 425). Humanizing the teaching methods will help students feel connected to the context. By feeling connected, students will be more engaged in their studies. By being engaged, students feel empowered because they have some control in what they learn.

Banks (1993) states that "creating an empowering school culture for students of color and low-income students involves restructuring the culture and organization of the school" (p. 7). I believe that by restructuring the culture of the school and organization, the school will be able to empower all students. Integrating diversity into the curriculum, empowers people of oppressed cultures by helping build self-esteem (Spring, 2014). Spring (2014) brings up an important aspect in the construction of curriculum: diversity. Students need to be able to relate to the curriculum so they can see themselves in what they are learning. By providing diverse curricula, you are helping students link the material from theory and concepts to their personal world. Shapiro and Stefkovich (2016) state that "many perspectives of students of color held were not race-bound but were influenced just as much or more so by the demographics, culture, age, gender, or by a

5

combination of these factors" (p. 5). It is important not to categorize or to label students. For a teacher, it is a best practice to get to know the student personally to understand them and their interests. This will draw students' attention and keep them engaged in their learning (Shapiro & Stefkovich, 2016).

Constructing effective online communities provides the opportunity for students to learn how to work with others who may be different from them (i.e., age, race, religion, geography, etc.). An effective online community promotes problem-solving skills and decision-making skills that help students become well-prepared for their lived world. "The school is communally rather than bureaucratically organized. We will not get all students to achieve high standards until we personalize the learning experience of all our young adults" (Northeast and Islands Regional Educational Lab at Brown University, 2001, p. 12).

Educators need to be able to determine which instructional method will work best given the situation. The important point is to get students engaged in their education to enhance their abilities. Educators can repeatedly think about their practice and learn from their experiences by utilizing diverse strategies to enhance abilities in all their students.

1.4 Research Questions

The primary question in this action research Dissertation in Practice (DiP) was "How, if at all, can student-centered instruction increase achievement of students within a graduate level data analytics course in an e-learning environment?" The literature reviewed by this me supports environments that enable students to make connections between school content and their lived experiences. Students become more engaged in their learning when they can relate the material to their lived worlds. When students

6

make this connection, they start to set greater expectations for themselves and, thus, are more likely to reach their highest academic potential. As an educator and as a researcher, it is essential to absorb as much knowledge as possible about how to best improve students' academic abilities.

For this reason, a supporting research question that needed to be examined was "How can educators of graduate students in a data analytics course implement student-centered instruction in the e-learning environment?"

1.5 Purpose Statement

The purpose of the present action research study was to analyze student-centered instruction in the e-learning environment in a graduate level course on data analytics at Southern New Hampshire University. The purpose of e-learning is to provide a forum to share information. E-learning provides the platform to be able to communicate and educate individuals through various forms of knowledge. The addition of situated learning experiences enhances the learning process and should be encouraged. This shared communication through technology needs to be properly structured.

The reasoning for e-learning is quite forthright. If the approaches are effective and beneficial, students' perceptions toward using them will be enhanced through the experience. On the contrary, poor experiences lead to changes in perceptions, too, but toward avoidance, which is what we, as graduate educators, are hoping to avoid.

When effective collaborative systems, such as Adobe Connect, are utilized correctly in an online course, it allows the instructor and students to effectively interact and collaborate, providing a great experience for all involved.

7

1.6 Methodology

Student participants received e-learning instruction through Blackboard software. Action research methods were used to collect data, analyze data, reflect on the data with the student participants, and develop an action plan to improve student scholarly activity in the Foundations of Data Analytics course. I am a professor at the university and teaches the Foundations of Data Analytics course.

1.6.1 What is Action Research?

Action research is based on reflection. In the book, *Action Research: Improving Schools and Empowering Educators*, Mertler (2014) states,

> Action research is primarily about critical examination of one's own practice. Reflection, as it pertains to action research, is something that must be done at the end of a particular action cycle. It is a crucial step in the process, since this is where I review what has been done, determine its effectiveness, and make decisions about possible revisions for future implementations of the project (which, in all likelihood, will comprise future action research cycles) (p. 44).

Mertler (2014) believes effective educators frequently reflect on and critically analyze their practice during the process of teaching and not only at the end of a cycle. Reflection should occur during course design, during lessons, after lessons, and after student assessments. Deal and Peterson (2013) state that "when school leaders reflect and feel they understand a school's culture; they can evaluate the need to shape or reinforce it" (p. 275). Reflecting throughout the process, allows me to monitor and make adjustments when necessary. Educators must be willing to adjust and adapt to change even if it means altering their original plan. According to Mertler (2014), educators must be flexible in

8

their decision-making process in order to succeed in action research. Reflection is the most critical and most challenging step for educators to perform. Reflection is incorporated in every step of action research. This step analyzes everything that surrounds educators as well as themselves. For these reasons, I believe that step nine, *Reflecting on the Process*, is the most difficult and most crucial step for me to complete as an educator who is interested in creating student-centered e-learning environments in higher education.

Howard (2003) states that "the nature of critical reflection can be an arduous task because it forces the individual to ask challenging questions that pertain to one's construction of individuals from diverse racial, ethnic, and cultural backgrounds. While posing these questions proves difficult, honest answering of such questions becomes the bigger and more difficult hurdle to clear" (p. 198). As our schools are becoming more diverse, it is imperative for educators to reflect on racial and cultural differences. Educators need to engage in the reflection process so they can create culturally relevant pedagogy. Paris (2012) believes that "culturally relevant pedagogy would propose to do three things—produce students who can achieve academically, produce students who demonstrate cultural competence, and develop students who can both understand and critique the existing social order" (p. 93). Reflection helps educators improve instruction and empower students by connecting the content to the students' lived world.

This action research study examined the effectiveness of using student-centered instruction at the graduate level in a data analytics class within the online learning environment. Of the four types of action research described by Hendricks (2009), classroom action research is the research that was employed. Hendricks (2009) defines

9

classroom action research as "a form of action research that is conducted by educators in their classrooms with the purpose of improving practice. It values the interpretations that educators make based on data collected with their students" (p. 10). Hendricks expands on the methodical process, which includes continuous reflection and a sequence of phases that "constantly corkscrew starting with reflect, act, evaluate, reflect, act, evaluate" (p. 11). According to Hendricks, action research uses both data collecting approaches, the quantitative and the qualitative, to recognize and examine a problem being tested by an investigator.

Ferrance (2000) defines action research as a procedure in which teacher researchers scrutinize their own educational practice methodically and prudently, using the methods of research. Ferrance describes the steps in the action research process:

Identify the problem, gather data, interpret data, act on evidence, evaluate results, and next steps, which involves identifying additional questions raised by the data and plan, and plan for additional improvements, revision, and next steps. The benefits to action research are 1) focus on school issue, problem, or area of collective interest, 2) form of teacher professional development, 3) collegial interactions, 4) potential to impact school change, 5) reflect on own practice, and 6) improved communication (pp.13-15).

1.6.2 Setting

The study took place at Southern New Hampshire University. At Southern New Hampshire University, the total enrollment (undergraduate, graduate, and online programs) is approximately 40,000 students. The school is a nonprofit, coeducational, and nonsectarian university with approximately 720 teachers. At the time of the study, I

was teaching Foundations of Data Analytics, working with students interested in understanding and manipulating data for valuable insights. I chose to complete the study within the online classroom to improve his educational practice. The instructional platform used is Blackboard. I have been teaching at the university for three years. A request for permission to complete this action research was submitted to the dean of the school. The dean approved the study.

1.6.3 Subjects and Participants

The student participants who are enrolled in the Data Analytics Masters Degree Program took my Foundations of Data Analytics course in Summer 2017. Student participants are mostly adults ranging in age from 22 to 52. There are approximately 5% Black students, 90% White students, and 5% Asian students. Of all students in the data analytics masters program, 20% are female and 80% are male (Foss, 2017). All student participants who participated in this action research study was registered for the data analytics class at the time of the study. All subjects in the program are scheduled for classes based on the classes needed to satisfy graduation requirements, scheduling, and available space. The subjects who participated in this action research study were registered for the class by the program's lead advisor. The student participants agreed to be part of the study when they enrolled in the course. I received consent from the student participants to collect their data. The student participants' identities were protected by using pseudonyms.

1.6.4 Procedures and Data Collection Methods

Data collected included the graduate students' assignment submissions in Blackboard. Additionally, student surveys were collected through a university evaluation

site. Both Blackboard and the university collected and categorized the data into descriptive statistics (overall grade, grade distribution, minimum value, maximum value, range, mean, median and standard deviation). There are also sections in the university's evaluation that allowed the student participants to write essay format responses to questions. This information was collected and reviewed as well.

Richard Felder (2015) describes three methods used to implement student-centered instruction. The three methods Felder describes are "active learning, cooperative learning, and inductive teaching and learning, which is also known as inquiry-based learning, case-based instruction, problem-based learning, project-based learning, discovery learning, and just-in-time teaching. Inductive teaching and learning is the method chosen to implement student-centered instruction for this action research" (p. 1). The practical steps provided by Johnson (2003) corroborate the method of implementation of student-centered instruction described by Felder. Johnson informs investigators that implementation should begin with planning with the end in mind (plan backward). Assessment should be authentic and carried out in the form of projects and portfolios. Inductive learning and teaching are also discussed by McWhorter and Hudson-Ross (1996) as being an effective method for connecting the focus on an individual student's learning. Inductive teaching and learning was used in this study, and the student participants were assessed on their final projects. The students also used the Blackboard discussion board as a communicative device related to the final assessment of the inductive teaching and learning project.

This study occurred in Summer 2017 and involved the implementation of a teacher-centered instructional approach and a student-centered instructional approach

12

across two sections of the same course. This provided a basis to analyze the performance for each student participant. The teacher-centered approach course was designed based on the standards for the curriculum set by the university. Students were administered traditional instruction, which included practice tests and exams administered via Blackboard. The traditional format was administered for a full graduate term (10-weeks). The student-centered course consisted of students taking a newly designed 10-week graduate course. This newly designed course differed from the teacher-centered course by allowing students to choose case studies that were of interest to them. The newly designed course also allowed students to share their thoughts on the discussion board in Blackboard each week. The discussion board topics were more open ended to allow students to relate the topics to their personal areas of interest.

Student achievement (overall grade, grade distribution, minimum value, maximum value, range, mean, median and standard deviation) and student surveys were compared from students taking the teacher-centered instruction and the student-centered instruction to determine the differences.

CHAPTER 2

REVIEW OF LITERATURE

2.1 The Problem of Practice in Context

Southern New Hampshire University is in the process of creating effective e-learning environments. Students are disengaged in the graduate program in data analytics, and this disengagement is exacerbated by traditional, top-down instruction. By using student-centered instruction, students should be able to apply the methods more easily because they can relate the theories/concepts to their lives. "Student-centered teaching methods shift the focus of activity from the teacher to the learners. These methods include active learning, in which students solve problems, answer questions, formulate questions of their own, discuss, explain, debate, or brainstorm" (Oakley et al., 2004, p. 11). Student-centered classrooms recognize that a student shifts through stages and are designed to cultivate true interests. Educators should create an atmosphere advantageous to learning and encourage the development of students' learning experiences.

2.2 Student-Centered Instruction and Student Achievement

"Student-centered teaching methods shift the focus of activity from the teacher to the learners. These methods include active learning, in which students solve problems, answer questions, formulate questions of their own, discuss, explain, debate, or brainstorm" (Oakley et al., 2004, p. 11). Student-centered classrooms recognize that a student shifts through stages and are designed to cultivate true interests. Educators should create an atmosphere advantageous to learning and encourage the development of

14

students' learning experiences. Student-centered instruction empowers students and provides them with a voice, making them responsible for their work and actions (Johnson, 2003). Research shows that focusing on individual student learning connects cooperative learning, performance assessment, multiple bits of intelligence, and constructivism, in which, all of the concepts mentioned positions the students in the center. Johnson (2003) also contends these concepts are the inevitable product of constructivist thinking. Gardner (2006) states that founded on his theory of multiple bits of intelligence:

> Almost any topic which is worth spending time on can be approached from at least six different "windows" into the same room: 1 Narration: the story mode. 2 A quantitative, logical rational way of dealing with numbers, principles, causality. 3 A foundational way, asking basic kinds of questions such as 'Why is this important? How does it relate to what came before? How is it related to our lives today?' 4 Aesthetic: What does it look like? What does it sound like? What appearance does it make? What patterns and configurations? How does it impress you? 5 Hands on: What is it like to be this thing, to do this thing? If you're studying evolution, what is it like to breed Drosophila? If you're studying democracy, what's it like to be in a group that decides by consensus as opposed to one that decides by autocracy, oligarchy, or some other political principle? 6 Personal: Can you integrate this topic through debate, role play, projects, jigsaw participation, and other joint interactions? (p. 142).

In the nineteenth century, "teachers during this time period were of two major types: the intellectual overseer, who stressed memorization and punished failures in

15

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assignments, and the drillmaster, who had the students repeat material unison" (Spring, 2014, p. 147). The instructional approach in which the schooling of today remains functions on a construction provided by The Committee of Ten 1892-93. This structure functions on the teacher-centered instructional approach. The original education program, which is measured to be teacher-centered because it places all the importance on the educator and not the student, still rules education. This teacher-centered instructional method was not designed for educating all but only a small proportion of students who adjusted to it. Is there any reason why a vast number of students continue to fail at an increasing rate? Johnson (2003) considers teacher-centered education to be "thoughtlessly unphilosophical. The main purpose of school is to create dynamic, self-governing citizens" (p. 3).

In a pilot study, the pros and cons to student-centered instruction were examined (Schumacher & Kennedy, 2008). In the study, the authors discovered that teachers who applied the student-centered approach found that this form of instruction involved a significant amount of preparation. The teachers had inquiries on how to spend their time, how to deal with at-risk students, and how to incorporate the various materials relating to all students. The cons for student-centered instruction are that it takes a significant amount of classroom time, and teachers felt forced to incorporate all the concepts outlined in the standards. Student-centered instruction requires a significant amount of time and effort on the part of teachers, but the results of the effort have life-changing effects for the student.

While there are benefits to student-centered instruction, Chall (2008) states that student-centered instruction failed to produce increased academic achievement for all

16

students. The author found that "the teacher-centered approach yielded higher academic achievement within all social classes and races, for students with disabilities, and with at-risk students. Students from low socio-economic backgrounds showed greater achievement when taught with the teacher-centered approach. These students lacked the readiness skills necessary to move forward academically at a young age" (p. 170). As the students moved up in grade level, it became more apparent that the students were not performing at grade level. The low functioning students and students from low-income families were found to thrive better in a more traditional setting due to lack of knowledge content. Students from middle-income or higher-income distinction proved to perform at a higher achievement level with the student-centered approach, possibly because of home factors and exposures.

In the study, Chall (2008) reported on teachers' experiences with student-centered instruction. "The teachers had implemented methods that are favored by student-centered instruction, but the results led to sleepless nights for one teacher and lower reading achievement scores. Another teacher experienced disruptive behaviors in classes which were only managed by returning to the traditional teacher-centered approach instruction" (Chall, 2008, p. 172). While there were many, including parents and students, who favor the traditional teacher-centered approach, there were many who were highly committed "that a progressive, student-centered approach, is best—for a democracy and for the social and emotional well-being of the child, as well as for academic progress" (Chall, 2008, p. 178). Chall reported on an eight-year study of high school students, which found no significant difference between the student-centered approach and the teacher-centered

17

approach, but the small differences that were found seemed to favor the student-centered approach.

Aaronsohn (1996) completed a case study to prove that with support and effort, student-centered instruction works for both the student and the teacher. In this study, Aaronsohn (1996) documented her experience with a teacher who taught high school English with the teacher-centered approach and felt she was not fully meeting students' needs. The teacher in the study began to implement methods that would allow the students to construct their own meaning.

Aaronsohn (1996) reported the frustrations and isolation from colleagues felt by the teacher and also on the resistance of the students when more responsibility of learning was placed onto them. The teacher in the study reported that at times, she struggled to stay back when the students complained about the responsibility given to them, but she continued to try despite how hard it was. The teacher in the study felt that without the support of her mentor, Aaronsohn (1996), she would have resorted back to traditional teacher-centered instruction. Mentors are important to have in a teacher's life. Mentors help guide teachers in their decision making in the classroom.

The conclusion of the study proved to be successful for both the teacher and the students. The teacher fully committed to the progressive student-centered approach, and because of this, she felt less pressure. She mentioned that she enjoyed her work a lot more using the student-centered approach. More importantly, the students no longer resisted but instead moved in the groups cooperatively and began working without having to be told what to do. The teacher went on to supervise more student teachers and hold

18

workshops for others who believed that the student-centered approach could work successfully in high schools (Aaronsohn,1996).

The active learning strategies in student-centered instruction promote meaningful learning, increase the retention of content, improve student attitude, and increase the development of critical thinking skills (Rutledge, 2008). The use of Howard Gardner's six approaches appears to support the implementation of student-centered instruction by offering two advantages. One advantage is that the teacher is more likely to reach all students, and the second advantage is it gives the opportunity to model what it's like to be an expert. Even with all the positive research and evidence of the effectiveness of student-centered teaching, very few teachers are implementing this type of instruction within classrooms.

Conti and Wellborn (1986) led a study to observe the relationship of instruction to student achievement for health professionals taking credit classes in a nontraditional format. The subjects in the study were 18 teachers and 256 students. The type of instruction was found to be meaningfully related to student achievement. The students of the teachers practicing the student-centered approach achieved at a higher level than the group average. The results reinforced the use of the collaborative, student-centered approach as an effective method of teaching students.

In another pilot study, there is evidence that students performed better academically in a student-centered approach environment because they had a say in what they learned and the teachers only acted as facilitators in order to allow the students to learn actively (Walsh & Vandiver, 2007). Wohlfarth et al. (2008) studied the idea that the student-centered model advances from the traditional teacher-centered model by

19

concentrating on students more than teachers and learning more than teaching. Graduate students in student-centered classrooms were surveyed about their perceptions and their experiences in relation to the student-centered model. The students mentioned that the student-centered approach contributed to their feeling of being respected as students. The students also believed the student-centered approach developed their critical thinking skills. The overall findings were that graduate students in student-centered classrooms agreed that their classroom experiences were indeed enhanced by the student-centered approach versus the teacher-centered approach.

In a 2001 pilot study of more than 20,000 students at both secondary and postsecondary levels, there were distinct differences between teacher and student perceptions of teaching methods (McCombs, 2001). The data was collected with the Assessment of Learner-Centered Practices (ALCP) surveys. The surveys help teachers reflect on and alter teaching methods as well as recognize staff development needs. The results of the research with the ALCP teacher and student surveys at both the secondary and postsecondary levels have established that "(a) student perceptions of their teachers' instructional practices are significantly related to their motivation, learning, and achievement; (b) teacher perceptions of instructional practices are not significantly related to student motivation and achievement; and (c) student perceptions of a positive learning environment and interpersonal relationship with the teacher are the most important factors in enhancing student motivation and achievement" (McCombs, 2001, p. 190).

Miglietti and Strange (1998) directed a study that included "61 adult (age 25 and over) and 95 traditional-age (ages 18 through 24) two-year college students. The students

20

replied to a series of instruments (Adult Classroom Environment Scale, Adaptive Style Inventory, Principles of Adult Learning Scale, and an Evaluation of Instruction Questionnaire) dispersed in five remedial English and five remedial mathematics courses" (p. 1). The study provided evidence that a student's age has minimal effect on students' expectations of the classroom environment, the teaching methods, and the course results. "The students in reading and mathematics classes with student-centered activities achieved higher course grades. Adult students in the mathematics sections reported a greater sense of accomplishment and a more positive total course experience than their traditional-age counterparts" (p. 18).

2.3 E-Learning Environment & Student Achievement

The wide use of e-learning in universities today is a cause for concern. E-learning education is a huge business for universities but there is a concern for the loss of community in the e-learning environment because of the distance between the students and the educators and the students and the universities (Spring, 2015, p. 215). Universities need to focus on creating a virtual community. A virtual community provides students and educators with the ability to interact and feel like a part of the school's community.

Montalvo (2006) describes the issues of designing and developing an online course. Montalvo (2006) believes that most of us have limited visions when it comes to online instruction. Montalvo (2006) also believes in a fully integrated approach to e-learning. He states that "courses should attempt to create e-learning communities by using the multiple communication tools offered in the course management systems. More integrated courses are a step up from 'Read this. Do this. Take this' courses" (p. 35).

21

The developmental needs of the students need to be addressed in the curriculum and unless instructional approaches are improved to suit the needs of the student, the promises of new technologies are likely to be unfilled (McLaughlin, 2013). McLaughlin (2013) states that "new technologies are undoubtedly important to improved practices, but they cannot be effective unless they are thoroughly understood and integrated by the user" (p. 204). The curriculum and the technologies used in the educational setting need to be based on the needs of the students for them to both be effective. This is a more complex task than one might assume.

The successful adoption of information and communication technology to enhance learning can be very challenging, requiring a complex blend of technological, pedagogical, and organizational components, which may at times require the resolution of contradictory demands and conflicting needs. McPherson and Nunest (2008) investigated and analyzed critical success factors (CSFs) that are required to deliver e-learning within higher education courses and programs. The research design adopted a critical research approach, instantiated by focus group discussions with e-learning experts drawn from administrative, educational, technology and research domains. The findings revealed that staffing issues, pedagogically sound delivery models, and training of both tutors and students cannot be treated as trivial issues and are critical to the success of e-learning. Furthermore, this research also shows that there is a strong relationship between these factors and inspirational institutional leadership. The findings also suggest that to assure the success of e-learning, this leadership should guarantee the presence of institutional enablers. It is hoped that the CSFs will provide a suitable

22

theoretical foundation to underpin the successful delivery of e-learning within higher education (Nunest, 2008, p. 443).

With all the constructive research and confirmation of the usefulness of student-centered teaching, still very few educators are implementing this type of instruction within classrooms. Research has claimed many benefits to using student-centered instruction. According to McWhorter and Hudson-Ross (1996), student-centered instruction decreases competition, inspires students to work together, constructs classroom communities, and permits students to become cohorts in the classroom in which the educator operates as a facilitator, cooperating with students on decisions that are to be made.

Wang et al. (2008) found that

Adapted self-assessment questionnaires examined the relationships between the learning motivation, learning strategies, self-efficacy, attribution, and learning results of 135 distance learners. The aim was to model the relationship between psychological characteristics and learning results of distance learners. The outcomes of this study show that a relationship exists between psychological characteristics and learning scores of distance learners. First, there is a relationship between self-efficacy, learning strategies, and learning results; second, there is a relationship between self-efficacy, internal attribution, learning motivation, and learning results. Learning motivation and learning strategies are clearly associated with positive and predictable effects on learning results. Self-efficacy and internal attribution have indirectly positive predictable effects on learning results (p. 17).

Students enrolled in an e-learning class are likely to have different learning styles than comparable traditional class students (Diaz and Cartnal, 1999). The authors concluded that e-learning students are more independent than traditional class students in their styles as learners. The traditional class students appeared to match the profile of traditional students who are willing to work in class provided they can obtain rewards for working with others and for meeting the teacher's expectations. E-learning students appeared to be driven more by intrinsic motives and clearly not by the reward structure of the class.

There are a growing number of educational programs throughout the United States encouraging teachers to utilize technology in their classrooms (Grinager, 2006). Evidence suggests that students perform better in an e-learning environment versus the traditional in-person environment. "Test results show that, on most state tests, students enrolled in e-learning classrooms score higher than students enrolled in traditional classrooms. In addition, low-income and special education students in e-learning classes generally score higher than their traditional classroom peers" (Honey, 2005, p. 3). These results are important to recognize because the goal is for students to excel and achieve the highest level possible. It is important to enhance what contributes to students' success.

In a pilot study, there was an investigation on the achievement levels and attitudes of college students toward learning in the classroom, a blended setting, and the e-learning environment (Alseweed, 2013). The subjects were 37 students who were studying a course at a community college. The students were randomly divided into three groups to fit into each class setting. The results of the study showed significant differences in the students' achievement levels in favor of blended learning over the other two class

24

settings. In addition, the results of a survey indicated there was a significant difference in the students' attitudes in favor of blended learning.

In a study investigating the effectiveness of using e-learning classes on students' achievement, evidence showed that e-learning is restructuring the way information is distributed.

The study compared the effectiveness of e-learning and traditional classroom learning. The study sample consisted of 62 students (22 males and 40 females) enrolled in the first semester of 2006. The researcher prepared a test that was used as a direct-test and post-test for measuring the effectiveness of e-learning compared with the traditional method (Haq, 2007, p. 1).

There were statistically significant differences in the students' achievement between the e-learning group and the traditional group. The differences were in favor of the e-learning group, as measured by the test scores.

Zhang et al. (2004) directed a study that compared the effectiveness of an e-learning environment versus the traditional classroom environment. The study consisted of four college-level classes. Two classes were in the traditional classroom and the other two classes were in the e-learning classroom. In the results of the study, the achievement scores of students who completed the class through an e-learning classroom were significantly higher than those of students in the traditional classroom. In the results of the survey, most students in the e-learning classroom stated they liked the self-controlled learning process. The survey indicated that most students would rather participate in an e-learning class over a traditional class.

25

2.4 Student-Centered Instruction in the E-Learning Environment

"The learner-centered approach provides a foundation for transforming education, inclusive of the potential role of technology. Technology can be used to change the role of teachers to that of co-learners and contributors to the social and interpersonal development of students" (McCombs & Vakili, 2005, p.1596). E-learning can provide a way to concentrate on student development and help students connect to content on a global scale. This research has provided evidence that e-learning can significantly increase student retention in degree programs. The evidence suggests that students are increasingly motivated, social, and have better learning outcomes in student-centered e-learning environments.

Rovai et al. (2007) directed a study that utilized "multivariate analysis of variance to determine if there were differences in measures of motivation between students enrolled in 12 e-learning and 12 traditional classroom university courses (N = 353)" (Rovai et al., 2007, p. 416). The results of the study "provides evidence that e-learning students possess stronger intrinsic motivation than on campus students who attend face-to-face classes on three intrinsic motivation measures: (a) to know, (b) to accomplish things, and (c) to experience stimulation" (p. 419). The study also compared graduate students and undergraduate students. "The results indicated that graduate students reported stronger intrinsic motivation than undergraduate students in both e-learning and traditional courses" (p. 423). "There was no evidence of motivational differences based on ethnicity" (p. 426).

E-learning content developers and lecturers need to incorporate the design of student-centered instruction principles and strategies for e-learning classrooms

26

(Sarasvathi et al., 2009). Sarasvathi's (2009) study included test scores and a set of questionnaires designed for 60 students to evaluate their experiences in the student-centered e-learning environment. The test scores were significantly higher when students utilized the student-centered e-learning designed environment over the traditional teacher-centered designed e-learning environment. The questionnaires also indicated that the students had a more positive experience with the student-centered designed e-learning environment. "The sections of the questionnaires seek information respectively on learners' readiness and expectation, choice of presentation media, effective strategies in content, useful features to support the learning process, and learner perception toward the existing content" (Sarasvathi et al., 2009, p. 4). The results provide evidence that students agree the e-learning content, which follows student-centered instructional design strategies and principles, are helpful and useful for their own learning and achievement.

Nasirun et al. (2010) directed a study providing evidence that students' perception had an influence on the adoption and success of student-centered instruction in an e-learning classroom. The study explored the perceived ease of use and perceived usefulness as well as student achievement. The data collected was from 191 undergraduate students from a university. The results suggest there is a significant relationship between perceived ease of use and the success of student-centered instruction in an e-learning classroom. Test scores from the students indicate the student-centered e-learning environment increases the students' achievement levels.

An investigation on the effectiveness of the student-centered approach in e-learning courses showed evidence that students score much higher in learning environments using the student-centered approach versus the traditional teacher-centered

27

approach (Richards, 2002). In reference to the e-learning courses, Richards (2002) concluded that "there is a distinction between simple 'add-on' and more integrated models of learning" (p. 30). Integrated models of learning are more conducive to the student-centered approach. The simple 'add-on' is usually more conducive to the teacher-centered approach.

Selim (2007) led a study that examined the critical success factors (CFS) for students in the e-learning environment. The method of the study involved a survey and test scores of 538 university students (334 females and 204 males). "The specified e-learning CSF categories were based on the students' experiences and achievements and included instructor characteristics (attitude toward and control of the technology and teaching style), student characteristics (computer competency, interactive collaboration, and e-learning course content and design), technology (ease of access and infrastructure), and support" (p. 409). The most critical factors for a positive experience and higher student achievement in the study were the teacher's approach toward interactive learning and their teaching methods using e-learning technologies. These results from the survey and test scores indicate that the interactive learning process, which includes student-centered learning methods, more positively affect students' experience and achievement in the e-learning environment than other methods.

2.5 Creating Effective Learning Experiences

In order for a course to be designed properly, "there are three main elements that must be addressed: significant learning, integrated course design, and better organizational support" (Fink, 2003, p. 244).

28

Significant learning entails a learning-centered approach in the classroom, where educators decide first what students can and should learn in relation to the subject and then figure out how such learning can be facilitated (Fink, 2003). Fink (2003) states that "the taxonomy of significant learning identifies six kinds of significant learning that teachers can use to set more exciting educational goals for their instruction" (p. 244).

Foundational knowledge: Understanding and remembering the key concepts, principles, relationships, and facts that constitute what is usually referred to as the content of the course.

Application: Being able to engage in thinking about the subject, (for example, critical thinking, creative thinking, problem-solving, and decision making), developing other key skills, and learning how to manage complex projects.

Integration: Identifying the similarities and interactions between realms of knowledge, specific ideas, and people.

Human dimension: Interacting with oneself and with others in new and better ways; discovering the personal and social implications of new knowledge.

Caring: Changing one's interests, feelings, or values related to a subject.

Learning how to learn: Acquiring better student skills, learning how to inquire and construct knowledge on a specific subject, and learning how to become a self-directing learner (p. 245).
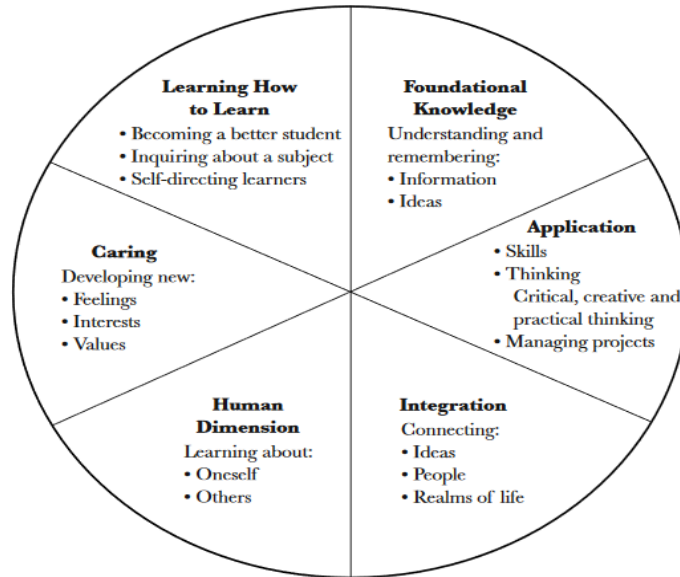
Figure 2.1 Fink (2003) Taxonomy of Significant Learning (p. 30)

Framing learning goals such as those in Figure 2.1 creates the possibility of students having a significant learning experience. "One important feature of this taxonomy is that it is not hierarchical but rather relational and even interactive. The diagram in Figure 2.2 illustrates the interactive character of this taxonomy. This more dynamic diagram is intended to show that each kind of learning is related to the other kinds of learning and that achieving any one kind of learning simultaneously enhances the possibility of achieving the other kinds of learning as well" (p. 32).
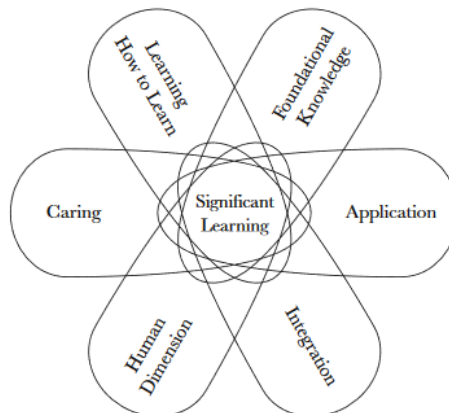
Figure 2.2 Fink (2003) The Interactive Nature of Significant Learning (p. 33)

30

"Integrated course design incorporates and organizes several existing and potent ideas about teaching, for example, active learning, and educative learning, and then shows how to increase the impact of these (and other) ideas by connecting and integrating them" (p. 245). In the integrated course design model, the teacher creates the design for a course by sensibly working through three phases of the design process:

Initial Phase: Build Strong Primary Components for the Course

1. Carefully analyze the situational factors.

2. Identify and set significant learning goals.

3. Create significant forms of feedback and assessment.

4. Create effective teaching and learning activities.

5. Integrate the four preceding components.

Intermediate Phase: Assemble These Components into an Overall Scheme of

Learning Activities

6. Identify the thematic structure for the course.

7. Create or select a powerful instructional strategy.

8. Integrate the structure and the teaching strategy into an overall scheme of
   learning activities.

Final Phase: Finish Up the Remaining Tasks

9. Develop a fair grading system.

10. Debug possible problems.

11. Write the course syllabus.

12. Plan an evaluation of the course and of your teaching (pp. 245-246).

31

The basic features of integrated course design are shown in Figure 2.3. "Situational Factors" is information that needs to be collected; the three circles are decisions that need to be made, and the arrows coming up from the box indicate that this information should be used in the decision-making process (Fink, 2003).
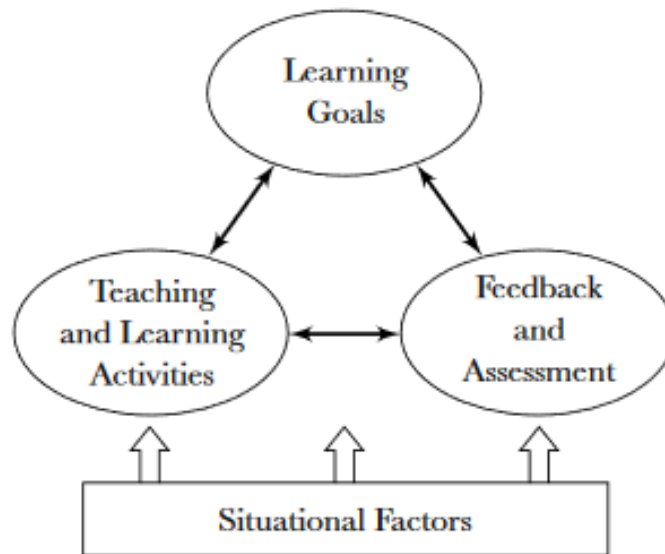
Figure 2.3 Fink (2003) Key Components of Integrated Course Design (p. 62).

Teachers need support when they are trying to incorporate new methods of instruction. Becoming a good facilitator is harder and more time consuming than being a good presenter of information. Without support at the institutional level, or significant individual motivation, change won't come easily (Fink, 2003). According to Fink (2003) professors need their universities to take specific steps to offer this support:

1. Make sure the institution is organized and operates in a way that is internally in alignment. It is important to have internal alignment so that there is an established set of commitments, systems, policies, strategies, procedures and behaviors that support integrated decision making within an institution.

32

2. Support faculty efforts to learn about new ideas on teaching and learning by making professional development an integral part of faculty work and establishing centers that can help faculty learn new ideas about teaching and learning.

3. Have institutional leaders, especially, department chairs, who can work with faculty in deciding how to make time available for professional development.

4. Evaluate teaching in a way that will foster a student-centered faculty perspective on teaching and on what they need to do to further enhance the quality of their teaching.

5. Develop mechanisms for educating students about what constitutes good teaching and learning, so they can effectively evaluate teaching (p. 246).

2.6 Definition of Terms

Achievement: Refers to "a thing done successfully, typically by effort, courage, or skill" (Oxford Dictionaries, 2015).

Active Learning: Refers to "the process whereby students engage in activities, such as reading, writing, discussion, or problem-solving that promote analysis, synthesis, and evaluation of class content" (University of Michigan, 2014).

Blended Learning: Refers to "the practice of using both online and in-person learning experiences when teaching students" (Great Schools Partnership, 2014).

Bias: Refers to "prejudice in favor or against one thing, person, or group compared with another, usually in a way considered to be unfair" (Oxford Dictionaries, 2015).

Case-Based Instruction: Refers to "the process whereby students develop skills in analytical thinking and reflective judgment by reading and discussing complex, real-life scenarios" (University of Michigan, 2015).

Cooperative Learning: Refers to "a teaching method in which students of differing abilities work together on an assignment" (School Wise Press, 2008).

Culture: Refers to "the customs, arts, social institutions, and achievements of a particular nation, people, or other social group" (Oxford Dictionaries, 2015).

Curriculum: Refers to "the subjects comprising a course of study in a school or college" (Oxford Dictionaries, 2015).

E-learning: Refers to "learning conducted via electronic media, typically on the internet" (Oxford Dictionaries, 2015).

Inductive Learning: Refers to "a powerful strategy for helping students deepen their understanding of content and develop their inference and evidence-gathering skills" (Great Schools Partnership, 2014).

Inquiry-Based Learning: Refers to "a complex process where students formulate questions, investigate to find answers, build new understandings, meanings and knowledge, and then communicate their learnings to others" (Alberta Education, 2015).

Integrated Course: Refers to "a course that covers several subjects" (School Wise Press, 2008).

Learner-Centered Approach: Refers to "the fact that all student activities involve active cognitive processes, such as creating, problem-solving, reasoning, decision-making, and evaluation. In addition, students are intrinsically motivated to learn due to the meaningful nature of the learning environment and activities" (University of Oregon, 2014).

Pedagogy: Refers to "the method and practice of teaching, especially as an academic subject or theoretical concept" (Oxford Dictionaries, 2015).

Personalized Learning: Refers to "a diverse variety of educational programs, learning experiences, instructional approaches, and academic-support strategies that are intended to address the distinct learning needs, interests, aspirations, or cultural backgrounds of individual students" (Great Schools Partnership, 2014).

Problem-Based Learning: Refers to "a teaching method and an approach to the curriculum. It consists of carefully designed problems that challenge students to use problem-solving techniques, self-directed learning strategies, team participation skills, and disciplinary knowledge" (University of Michigan, 2015).

Project-Based Learning: Refers to "any programmatic or instructional approach that utilizes multifaceted projects as a central organizing strategy for educating students" (Great Schools Partnership, 2014).

Reflection: Refers to "a process where teachers think over their teaching practices, analyzing how something was taught and how the practice might be improved or changed for better learning outcomes" (Study.com, 2015).

Setting: Refers to "the place or type of surroundings where something is positioned or where an event takes place" (Oxford Dictionaries, 2015).

Schooling: Refers to "education or training received, especially at school" (Oxford Dictionaries, 2015).

Student-Centered Approach: Refers to "a wide variety of educational programs, learning experiences, instructional approaches, and academic-support strategies that are intended to address the distinct learning needs, interests, aspirations, or cultural backgrounds of individual students and groups of students" (Great Schools Partnership, 2014).

Teacher-Centered Approach: Refers to "learning situations in which the teacher asserts control over the material the students study and the ways in which they study it—i.e., when, where, how, and at what pace they learn it" (Great Schools Partnership, 2014).

CHAPTER 3

ACTION RESEARCH METHODOLOGY

3.1 Introduction

This study was conducted to determine the effectiveness of using student-centered methodology within an e-learning environment for a graduate level class in data analytics at Southern New Hampshire University to enhance students' scholastic abilities. The term *scholastic abilities* refers to the students' capabilities to apply to their personal world what is being taught. Inductive teaching and learning was used in this study and the student participants were assessed on their discussion posts and final projects. Action research methods were used to collect and analyze the data. In this chapter I will share the problem of practice, purpose of the study, background on action research, research setting, subjects and participants, data collection, data analysis and action plan.

3.2 Statement of the Problem of Practice

Southern New Hampshire University is in the process of creating effective e-learning environments. Students are disengaged in the graduate program in data analytics and this disengagement is exacerbated by traditional, top-down instruction. This action research study explored and tested the effectiveness of using student-centered methodology within an e-learning environment for a graduate level class in data analytics to enhance students' abilities. The term *abilities* refers to the students' capabilities to apply what is being taught to their personal world. By using student-centered instruction, students should be able to apply the methods more easily as they can relate the

37

theories/concepts to their life. "Student-centered teaching methods shift the focus of activity from the teacher to the learners. These methods include active learning, in which students solve problems, answer questions, formulate questions of their own, discuss, explain, debate, or brainstorm" (Oakley et al., 2004, p. 11). Student-centered classrooms recognize that a student shifts through stages and are designed to cultivate true interests. Educators should create an atmosphere advantageous to learning and encourage the development of students' learning experiences.

3.3 Purpose Statement

The purpose of the study was to analyze student-centered instruction in the e-learning environment in a graduate level course on data analytics. The purpose of e-learning is to provide a forum to share information. E-learning provides the platform to be able to communicate and educate individuals through various forms of knowledge. The addition of situated learning experiences enhances the learning process and should be encouraged. This shared communication through technology needs to be properly structured.

The reasoning for e-learning is quite forthright. If the approaches are effective and beneficial, students' perceptions toward using them will be enhanced through the experience. On the contrary, poor experiences lead to changes in perceptions, too, but toward avoidance, which is what we, as graduate educators, are hoping to avoid. I believe there are instructors at the university at the graduate level who design their courses without the slightest idea or notion of how students think and learn. This point of view reminded me of the courses I disliked throughout my e-learning academic career and provided confirmation as to why I disliked them. The courses were not designed in a

38

manner that was favorable to my learning style and, thus, caused a lot of dissatisfaction within some of the courses.

The purpose of e-learning is to provide a forum to share information/knowledge that otherwise may not have the possibility to be shared. E-learning provides the platform to be able to communicate and educate individuals through various forms of knowledge. The addition of situated learning experiences enhances the learning process and should be encouraged. This shared communication through technology needs to be properly structured. When effective collaborative systems such as Adobe Connect, are utilized correctly in an online course, it allows the instructor and students to effectively interact and collaborate, providing a great experience for all involved.

3.4 What is Action Research?

Action research is based on reflection. In the book, *Action Research: Improving Schools and Empowering Educators*, the Mertler (2014) states,

> Action research is primarily about critical examination of one's own practice. Reflection, as it pertains to action research, is something that must be done at the end of a particular action cycle. It is a crucial step in the process, since this is where I review what has been done, determine its effectiveness, and make decisions about possible revisions for future implementations of the project (which, in all likelihood, will comprise future action research cycles) (p. 44).

Mertler (2014) believes effective educators frequently reflect on and critically analyze their practice during the process of teaching and not only at the end of a cycle. Reflection should occur: during course design, during lessons, after lessons, and after student assessments. Deal and Peterson (2013) state that "when school leaders reflect and feel

39

they understand a school's culture, they can evaluate the need to shape or reinforce it" (p. 275). Reflecting throughout the process allows me to monitor and make adjustments when necessary. Educators must be willing to adjust and adapt to change even if it means altering their original plan. According to Mertler (2014), educators must be flexible in their decision-making process in order to succeed in action research. Reflection is the most critical and most challenging step for educators to perform. Reflection is incorporated in every step of action research. This step analyzes everything that surrounds educators as well as themselves. For these reasons, I believe that step nine, *Reflecting on the Process*, is the most difficult and most crucial step for me to complete as an educator who is interested in creating student-centered e-learning environments in higher education.

Howard (2003) states that "the nature of critical reflection can be an arduous task because it forces the individual to ask challenging questions that pertain to one's construction of individuals from diverse racial, ethnic, and cultural backgrounds. While posing these questions proves difficult, honest answering of such questions becomes the bigger and more difficult hurdle to clear" (p. 198). As our schools are becoming more diverse, it is imperative for educators to reflect on racial and cultural differences. Educators need to engage in the reflection process so they can create culturally relevant pedagogy. Paris (2012) believes that "culturally relevant pedagogy would propose to do three things—produce students who can achieve academically, produce students who demonstrate cultural competence, and develop students who can both understand and critique the existing social order" (p. 93). Action research is based on reflection. Reflection will help educators improve instruction and empower students.

40

This study focused on the effectiveness of using student-centered instruction at the graduate level in a data analytics class within the online learning environment. Of the four types of action research described by Hendricks (2009), classroom action research is the research that was employed for the focus of this study. Hendricks defines classroom action research as "a form of action research that is conducted by educators in their classrooms with the purpose of improving practice. It values the interpretations that educators make based on data collected with their students" (p. 10). Hendricks expands on the methodical process which includes continuous reflection and a sequence of phases that "constantly corkscrew starting with reflect, act, evaluate, reflect, act, evaluate" (p. 11). According to Hendricks, action research uses both data collecting approaches, quantitative and qualitative, to recognize and examine a problem being tested by an investigator.

Ferrance (2000) defines action research as a procedure in which teacher researchers scrutinize their own educational practice methodically and prudently, using the methods of research. Ferrance describes the steps in the action research process:

> Identify the problem, gather data, interpret data, act on evidence, evaluate results and next steps, which involves identifying additional questions raised by the data and plan, and plan for additional improvements, revision, and next steps. The benefits to action research are 1) focus on school issue, problem, and or area of collective interest, 2) form of teacher professional development, 3) collegial interactions, 4) potential to impact school change, 5) reflect on own practice, and 6) improved communication (pp.13-15).

41

3.5 Setting

This study took place on Southern New Hampshire University's Blackboard site. At Southern New Hampshire University, the total enrollment (undergraduate, graduate, and online programs) is approximately 40,000 students. The university is a nonprofit, coeducational, and nonsectarian university with approximately 720 teachers. At the time of the study, I was teaching Foundations of Data Analytics, working with students who have interests in understanding and manipulating data for valuable insights. I chose to complete the study within the online classroom to improve his educational practice. I have been teaching at the university for three years. A request for permission to complete this action research was submitted to the dean of the school. The dean approved the action research study.

3.6 Subjects and Participants

The subjects were students who enrolled in the data analytics masters program. All subjects meet and qualify to participate in the program. The population within the program is mostly adults ranging in age from 22 to 52. All subjects in the program are scheduled for classes based on the classes needed to satisfy graduation requirements, scheduling, and available space. The subjects that participated in this action research study were registered for the classes by the program's lead advisor. The student participants agreed to be part of the study when they enrolled in the course. The student participants' identities were protected by using pseudonyms.

3.7 Procedures and Data Collection Methods

The student participants who were enrolled in the master's degree data analytics program took the Foundations of Data Analytics course with in Summer 2017. Student

42

participants are mostly adults ranging in age from 22 to 52. There are approximately 5% Black students, 90% White students, and 5% Asian students. Of all students in the master's degree data analytics program, 20% are female and 80% are male (Foss, 2017). All student participants who participated in this action research study were registered for the data analytics class at the time of the action research. All subjects in the program are scheduled for classes based on the classes needed to satisfy graduation requirements, scheduling, and available space. The subjects who participated in the action research study were registered for the class by the program's lead advisor. The student participants agreed to be part of the study when they enrolled in the course. I received consent from the student participants to collect their data. The student participants' identities were protected by using pseudonyms.

Bambrick-Santoyo and Peiser (2012) state that "data-driven instruction asks the most essential question an educator can ask: How can we make sure our students learn" (p. 53)? Data-driven instruction (qualitative and quantitative), when used correctly, can provide evidence if students are learning the material. Data can also provide what methods of instruction are helping students effectively learn. Data-driven instruction formed the basis of the data-collection for this study. To assess the viability of student-centered instruction, student grade data and student evaluative comments were analyzed, making this a mixed-methods study.

There are a number of potential benefits and potential weaknesses for collecting both qualitative and quantitative data. The potential benefit of mixed method research is that it balances effective data collection and analysis with data that provides context (ACET , 2012). "The quantitative data quickly and efficiently captures potentially large

43

amounts of data from large groups of stakeholders. The qualitative data provides the contextual information and facilitates understanding and interpretation of the quantitative data" (ACET , 2012, p. 2).

The challenge of collecting both qualitative and quantitative data is to ensure that the two data collection methods complement – but do not duplicate – each other (ACET , 2012).

When data collection methods are duplicative, costs for gathering that information are essentially doubled. For instance, it would be costly and inefficient to ask both focus group participants and survey respondents to indicate how many times they had visited a program's website. In contrast, it would be more informative and less costly to ask survey respondents to estimate how many times they visited a program's website and ask focus group participants why they do (or do not) visit the website (ACET , 2012, p. 2).

In this action research study, qualitative and quantitative data were collected on the graduate students' submissions in Blackboard and the university's evaluation site. The discussion board grades and final project grades were both collected in Blackboard and analyzed at the end of the course. Blackboard served as the class management site where all grade information and test assessments were and categorized into descriptive statistics (overall grade, grade distribution, minimum value, maximum value, range, mean, median and standard deviation). The student course evaluation surveys were collected through a university evaluation site at the end of the course. While course evaluations are largely quantitative in nature, there were also sections that allowed the

student participants to write essay format responses to questions. This information was also collected and reviewed.

Below are the survey questions the student participants answered at the end of the course on the university's evaluation site:

1. The syllabus is clear and outlines the requirements for the course (1=No, 2=Yes).

2. The grading criteria for the course are clear (1=No, 2=Yes).

3. The assignments, readings, and materials are relevant to the course (1=No, 2=Yes).

4. The instructions for each assignment are clear (1=No, 2=Yes).

5. The page layout and navigation of the course are easy to follow (1=No, 2=Yes).

6. Describe specific things about this course you would change.

7. The instructor demonstrated knowledge of the course content and materials (1=No, 2=Yes).

8. The instructor responded to my questions and concerns within 24 hours (1=No, 2=Yes).

9. The instructor provided helpful responses to my questions and requests (1=No, 2=Yes).

10. The instructor helped me understand the course content and assignments (1=No, 2=Yes).

11. The instructor set clear expectations about the requirements of the course (1=No, 2=Yes).

12. Describe specific things this instructor did well or did not do well.

Richard Felder (2015) describes three methods used to implement student-centered instruction. The three methods Felder describes are "active learning, cooperative learning, and inductive teaching and learning, which is also known as inquiry-based learning, case-based instruction, problem-based learning, project-based learning, discovery learning, and just-in-time teaching" (p. 1). Inductive teaching and learning is the method chosen to implement student-centered instruction for this action research. Johnson (2003) and Fink (2003) informs investigators that course planning should begin by planning with the end in mind (plan backward). Assessment should be authentic and carried out in the form of projects and portfolios. Inductive learning and teaching are also discussed by McWhorter and Hudson-Ross (1996) as being an effective method for connecting the focus on an individual student's learning.

Inductive teaching and learning was used in this action research study and the student participants were assessed on their final projects. For the final project, students selected 10 case studies (the final project is worth 70 points). The case studies could be found free online. Students could find the case studies by researching the Internet and the library. Students could also find case studies by searching these companies' websites: UPS, SAS, IBM, Teradata, and many others. By researching, summarizing, and analyzing real-world situations, students were able to see first-hand how businesses effectively utilize analytics as a competitive advantage. There were several milestones throughout the course to prepare students for the expectations of the final project. Each milestone was not graded. That is, no points were earned, but feedback was given to ensure students were on track to successfully complete the final project. Students were required to

46

incorporate the feedback I provided for each milestone into the final project. The students also used the Blackboard discussion board as a communicative tool. The scale for the total point value for the discussion board posts and the final project combined ranged from 0-100. Below are the discussion questions that were used in this action research study:

Week 1 – Introduce yourself and provide some background on your knowledge and experience in analytics.

Week 2 - In today's business environment, many factors can provide a competitive advantage. Why is analytics more or less valuable than other factors? What is the relationship between analytics and other factors (e.g., logistics, cost, or customer retention)?

Week 3 - While there appears to be evidence that businesses competing on analytics are also high performing businesses, how do we know if analytics is the cause of this success?

Week 4 - Is there any situation (other than regulated industries) when competing on analytics would be inappropriate or potentially unsuccessful? Why?

Week 5 - Suppose you are an analytic professional and tasked by your company with developing an analytics program that will evaluate an internal process, resulting in the greatest performance increase to the firm. What process would you choose to address? Why? What techniques might you use to analyze that process?

Week 6 - Should all businesses seek to become analytic competitors?

Week 7 - The prioritization of new analytic initiatives will likely be highly dependent on the business. What factors might influence what initiatives take precedent? As an analytic

professional, what might you consider if you were tasked with prioritizing new initiatives for your organization?

Week 8 - Data management is key in moving toward analytic competitiveness. As an analytic professional, what challenges might you face when establishing your organization's data management systems? How might you overcome those challenges?

Week 9 - As an analytic professional, you may face barriers to integration between the technically oriented and strategy oriented environments in your organization. How might you overcome those barriers? Why might they have developed in the first place? What might result if those barriers are not overcome?

Week 10 - Suppose you were an executive in your company. How would you use analytics to help drive and inform strategy development? Who would you consult? What information would you request?

This action research occurred in Summer 2017. This action research involved the implementation of a teacher-centered approach, which provided a basis in this analysis to provide a level of performance for each student participant. The teacher-centered approach course was designed based on the standards for the curriculum set by the university. These students were administered traditional instruction. The traditional format was administered for a full graduate term (10-weeks). The teacher-centered course and the student-centered course was simultaneously conducted. The student-centered course consisted of students taking a newly designed 10-week graduate course (See Appendix C). Student achievement (overall grade, grade distribution, minimum value, maximum value, range, mean, median and standard deviation) and student surveys were compared from students taking the teacher-centered instruction and students taking the

48

student-centered instruction. Grades from the final project and the discussion board questions were collected at the end of the course for analysis. Blackboard automatically calculates student achievement (overall grade, grade distribution, minimum value, maximum value, range, mean, median and standard deviation).

3.8 Data Analysis

The principle of data analysis is to "transform data into terms that are pertinent to potential readers" (Wolcott, 1994, p. 4). In this action research study, data analysis was used to help me test the effectiveness of using student-centered methodology within an e-learning environment for a graduate level class in data analytics at Southern New Hampshire University to enhance students' scholastic abilities. The data was analyzed using quantitative and qualitative methods. Descriptive statistics was used to analyze the quantitative data. "Descriptive statistics are used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures. Together with simple graphics analysis, they form the basis of virtually every quantitative analysis of data" (Social Research Methods, 2017). I utilized overall grade, grade distribution, minimum value, maximum value, range, mean, median and standard deviation for descriptive statistics.

Surveys were used to analyze the qualitative data. The surveys provided student participants with the ability to share their thoughts and opinions in a structured format. The essay questions provided the student participants with the ability to dive deeper into their reasons, opinions, and motivations. The essay questions provided more insight in areas of strength and areas of weakness for each section of the course. I utilized side-by-side comparison tables to show the quantitative differences and the qualitative differences

49

between the teacher-centered approach section and the student-centered approach section for the Foundations of Data Analytics course.

3.9 Action Plan

The results of the action research study were reflected upon with the student participants to formulate an action plan to improve the e-learning experience and improve student achievement. The student participants were able to communicate in the survey with me the strengths and weaknesses of the course. Student achievement provided insight into whether the student-centered course improves students' scholastic abilities. The input from the student participants will help me improve the e-learning experience for future students in the Foundations of Data Analytics course. Iterative design was used to continuously test, analyze, and refine the Foundations of Data Analytics course. If successful, I plan to use the same iterative design process for the entire analytics program at Southern New Hampshire University to enhance the e-learning experience while increasing student achievement.

50

CHAPTER 4

FINDINGS FROM THE DATA ANALYSIS

4.1 Introduction

Student participants received e-learning instruction through Blackboard software. Action research methods were used to collect data, analyze data, reflect on the data with the student participants, and develop an action plan to improve students' scholarly activity in the Foundations of Data Analytics course. I am a professor at the university and teach the Foundations of Data Analytics course.

4.2 Statement of the Problem of Practice

Southern New Hampshire University is in the process of creating effective e-learning environments. Students are disengaged in the graduate program in data analytics and this disengagement is exacerbated by traditional, top-down instruction. This action research study explored and teste the effectiveness of using student-centered methodology within an e-learning environment for a graduate level class in data analytics to enhance students' abilities. The term *abilities* refers to the students' capabilities to apply what is being taught to their personal world. By using student-centered instruction, students should be able to apply the methods more easily as they can relate the theories/concepts to their life. "Student-centered teaching methods shift the focus of activity from the teacher to the learners. These methods include active learning, in which students solve problems, answer questions, formulate questions of their own, discuss, explain, debate, or brainstorm" (Oakley et al., 2004, p. 11). Student-centered classrooms

51

recognize that a student shifts through stages and are designed to cultivate true interests. Educators should create an atmosphere advantageous to learning and encourage the development of students' learning experiences.

4.3 Research Questions

The primary question in this action research study was "How, if at all, can student-centered instruction increase achievement of students within a graduate level data analytics course in an e-learning environment?" The literature reviewed by me supports environments that enable students to make the connections between school content and their lived experiences. Students become more engaged in their learning when they can relate the material to their lived worlds. When students make this connection, they start to set greater expectations for themselves and, thus, are more likely to reach their highest academic potential. As an educator and as a researcher, it is essential to absorb as much knowledge as possible about how to best improve students' academic abilities.

For this reason, a supporting research question that needed to be examined was "How can educators of graduate students in a data analytics course implement student-centered instruction in the e-learning environment?"

4.4 Purpose Statement

The purpose of the action research study was to analyze student-centered instruction in the e-learning environment in a graduate level course on data analytics at Southern New Hampshire University. The e-learning technology was structured. The purpose of e-learning is to provide a forum to share information. E-learning provides the platform to be able to communicate and educate individuals through various forms of knowledge. The addition of situated learning experiences enhances the learning process

52

and should be encouraged. This shared communication through technology needs to be properly structured.

The reasoning for e-learning is quite forthright. If the approaches are effective and beneficial, students' perceptions toward using them will be enhanced through the experience. On the contrary, poor experiences lead to changes in perceptions, too, but toward avoidance, which is what we, as graduate educators, are hoping to avoid. I believe there are instructors at the university at the graduate level who design their courses without the slightest idea or notion of how students think and learn. This point of view reminded me of the courses I disliked throughout my e-learning academic career and provided confirmation as to why I disliked them. The courses were not designed in a manner that was favorable to my learning style and thus caused a lot of dissatisfaction in some of the courses.

The purpose of e-learning is to provide a forum to share information/knowledge that otherwise may not have the possibility to be shared. E-learning provides the platform to be able to communicate and educate individuals through various forms of knowledge. The addition of situated learning experiences enhances the learning process and should be encouraged. This shared communication through technology needs to be properly structured. When effective collaborative systems such as Adobe Connect, are utilized correctly in an online course, it allows the instructor and students to effectively interact and collaborate, providing a great experience for all involved.

4.5 Findings of the Study

The major findings from the quantitative and qualitative methods of research indicate that students in the student-centered graduate analytics e-learning environment

53

achieved higher scores and had a more positive experience than the students in the

teacher-centered graduate analytics e-learning environment.

Table 4.1 provides a side-by-side comparison of student achievement for the

student-centered e-learning environment and the teacher-centered e-learning environment

(See Appendix E and Appendix F for the total results including the grade distribution for

each section).

Table 4.1 Student achievement results for student-centered and teacher-centered

Quantitative Measure	Student-Centered	Teacher-Centered
Count (# of students in the class)	20	24
Overall Grade (% of class with an A)	85%	75%
Minimum Value	79.31%	15.34%
Maximum Value	100%	100%
Range	20.69	84.66
Mean	95.76%	89.83%
Median	97%	97.06%
Standard Deviation	5.22	18.05

The overall grade as a percentage of the class with an A (90%-100%) shows that

the student-centered e-learning environment achieved an A at a higher percentage of the

class than the teacher-centered e-learning environment (85% versus 75%). The

maximum values for each type of instructional environment were both 100%, while the

minimum values were drastically different. The minimum value for the student-centered

e-learning environment was 79.31%. The minimum value for the teacher-centered e-

learning environment was 15.34%. The 15.34% minimum value can be considered an

outlier which affects the quantitative analysis. With that being said, the second lowest

minimum value for the teacher-centered e-learning environment was still below the

54

minimum value of the student-centered e-learning environment (60%-69% versus 79.31%). The outlier also affects the range. The range of the student-centered e-learning environment was much smaller than the range of the teacher-centered e-learning environment (20.69 versus 84.66). The median scores for each section were virtually the same at 97% (97% versus 97.06%). The standard deviation of the student-centered e-learning environment is considered low at 5.22 while the standard deviation of the teacher-centered e-learning environment is considered high at 18.05. The teacher-centered e-learning environment had a higher standard deviation because the minimum value is so low. Further, the grade distribution directly affects the standard deviation. The grade distribution of the student-centered e-learning environment is highly concentrated in As and Bs while the teacher-centered e-learning environment is highly concentrated in As and Cs.

Table 4.2 provides a side-by-side comparison of the student survey for the student-centered e-learning environment and the student survey for the teacher-centered e-learning environment (See Appendix E, Survey Results and Appendix F, Survey Results for the total results of each survey).

Table 4.2 Student survey results for student-centered and teacher-centered

Survey Question	Student-Centered	Teacher-Centered
1. The syllabus is clear and outlines the requirements for the course.	100% Yes	100% Yes
2. The grading criteria for the course are clear.	100% Yes	100% Yes
3. The assignments, readings and materials are relevant to the course.	100% Yes	100% No

55

4. The instructions for each assignment are clear.	100% Yes	100% No
5. The page layout and navigation of the course are easy to follow.	100% Yes	100% No
6. Describe specific things about this course you would change.	- I enjoyed this course so I wouldn't change a thing -This course was difficult but I wouldn't change it -I would suggest cutting down on the amount of case studies due -I liked the assignments and that we got to choose the topics for them. I wouldn't change anything. -The professor was great and so was the material. N/A to changing anything. -I found this course to be useful since we could see what we are learning in action (case studies). -Course exceeded expectations and I	- I hate the course. I would change everything -This course did not provide any real-world situations to help me learn. -The instructor was great but the course was terribly designed. I would redo the whole course. -I would recommend changing this course. -I loved the course and wouldn't change anything. -Prof Camac was excellent but the course was poorly designed. -I couldn't wait for this class to be over. The material was outdated. -I hated the course materials

56

enjoyed the variety of challenges.

-I didn't like the text book but everything else was great

-I enjoyed the course a lot. I wouldn't change anything.

-Nothing

-The course is well constructed. I cannot think of any specific improvements needed.

-N/A

-Nothing

-Data analytics is difficult to learn but the professor set up videos to provide examples.

-None

-No suggested changes.

-Nothing as such

-The topics in this course were not new for me, but I still learned a lot because of the final

-The professor was good but the course was not interesting at all.

-Waste of money

-The course is well constructed. I cannot think of any specific improvements needed.

-I would suggest to use a different book or additional supplemental materials.

-I HATED the course.

-I could have used more example problems to illustrate what to use when.

-Use a better textbook.

-I would update it to make it easier to understand. Kyle did the best he could with what he was given

-I would say more examples, examples benefit everyone and can certainly

57

project using case studies

-I enjoyed the discussion questions in this course than previous courses because I was able to utilize what I have learned and apply it to my own life.

-This class was excellent.

help get the ball rolling

-Despised the course

-On the site layout, references to other pages on the course blackboard page could be better linked. i.e. when a paper is assigned in the 'Learning Module' folder for a given module, the link for the rubric for that specific paper could be included.

-I am glad I made it through the course

-Clarify assignment requirements, milestones, etc. Update some content, it is a repeat of DAT-500.

-The syllabus should have been updated and clearer English used for assignments. Too many time students email the professor

-This course was a waste of money. It

58

		repeated the intro course.
		-Much too easy of a course
7. The instructor demonstrated knowledge of the course content and materials.	100% Yes	100% Yes
8. The instructor responded to my questions and concerns within 24 hours.	100% Yes	100% Yes
9. The instructor provided helpful responses to my questions and requests.	100% Yes	100% Yes
10. The instructor helped me understand the course content and assignments.	100% Yes	100% Yes
11. The instructor set clear expectations about the requirements of the course.	100% Yes	100% Yes
12. Describe specific things this instructor did well or did not do well.	- The professor went out of his way to make sure I understood the material. -I liked how I was able to choose what I wanted to do on the assignments. -The instructor enjoys teaching and you can tell by the way he teaches.	- The professor explained the assignments well. -The instructor did everything he could to make the class interesting. -The feedback from the instructor is valuable. -The professor was very knowledgeable

59

-I enjoyed the environment of this course because the instructor made it open and free

-Great professor with very good knowledge of the subject and gives instant replies to questions or emails.

-The professor provided constructive feedback that helped in my learning.

-The instructor was very supportive in every aspect of the course

-The professor was consistent and thorough on all of the assignments

-Immediate feedback and grading on all questions and assignments

-I like how the professor sent weekly emails to remind me of the assignments due each week

-I am not sure if it is the instructor, or the course, but I felt the course was terrible.

-Professor Camac was an excellent communicator, his grading was always speedy, fair, and clear. It was a pleasure to be in his class.

-Amazing response time on submitted assignments and questions. Very supportive overall.

-Very efficient and timely in grading assignments.

-First professor whom replied to emails and graded so quickly.

-Excellent professor. The best I have had but one of the worst classes' content wise ever.

-He provided excellent reminders about due dates and detailed feedback via the evaluation

60

-The instructor was very positive in his feedback even when I was lost on an assignment

-This professor is the most attentive I have had at SNHU

-The professor enjoys teaching which makes it a great atmosphere to learn

-Best professor

-The instructor is a very effective communicator

-Kyle was very quick in grading assignments and answering questions.

-The instructor was very present in the class, answering questions and responding to discussions quickly. Assignment grading was completed in a very timely manner and the feedback was helpful.

of assignments. He also provided excellent information connecting the course material to the actual data analytics business world and identifying excellent professional development resources.

-Kyle was an excellent instructor

-The instructor always got back to my emails very quickly. I felt supported throughout the course and felt like the course was designed with the student in mind.

-Graded too easily

-The instructor is very knowledgeable in data analytics

-Professor Camac communicated well and graded fairly

-The instructor was good at providing feedback and

61

-Insanely fast at replying and grading.

-Professor Camac is always very responsive to questions and concerns. He gives constructive feedback on homework and papers. One night, we discussed one of my concerns. He never once made me feel like I was bothering him or my issues were not relevant. He spent time with me until I understood the topic. I hope to take other courses with this instructor.

-The instructor went above what was expected to teach this class. I enjoy working with him.

answering questions.

-The content was bland but the instructor shared his real-world experience which helped me learn

-I guess the instructor was good but I was so upset by the course I didn't notice

-The instructor explained unclear concepts well

-N/A

-Adds in his 2 cents, plus ten more cents. Offers a lot in terms of his prior knowledge and experience.

-I liked how he sent emails & or provided announcements a few times a week

-Provided excellent feedback that I could incorporate in my following assignments

The survey results were different between the student-centered e-learning

environment and the teacher-centered e-learning for questions 3, 4, 5, 6 and 12. The

62

student-centered e-learning environment received mostly positive responses from student participants for every question of the survey. A consistent answer from the student-centered student participants regarding what they liked most about the course was that they liked the freedom they had in choosing their final project. They enjoyed it because they could apply the concepts to their life. This made learning fun and enjoyable.

The teacher-centered e-learning environment received negative responses from a majority of student participants in the survey. The teacher-centered student participants did not think the assignments and readings were relevant and that the course materials were outdated and bland. The teacher-centered student participants thought the instructions were not clear and that the page layout and navigation of the course were not easy to follow.

4.6 Conclusion

Student achievement provided insight into whether the student-centered course improves students' scholastic abilities. In this specific study, the data from student participants in each section provides evidence that the student-centered course improved students' scholastic abilities. Most of the student participants in the student-centered e-learning environment received an A or B while most of the student participants in the teacher-centered e-learning environment received an A or C.

The student participants were able to communicate in the survey with me the strengths and weaknesses of the course. The student-centered e-learning environment received mostly positive responses from student participants for every question of the survey. The input from the student participants will help me improve the e-learning experience for future students in the Foundations of Data Analytics course. Iterative

63

design will be used to continuously test, analyze, and refine the Foundations of Data Analytics course. If successful, I plan to use the same iterative design process for the entire analytics program at Southern New Hampshire University to enhance the e-learning experience while increasing student achievement.

CHAPTER 5

DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

5.1 Introduction

Student participants received e-learning instruction through Blackboard software. Action research methods were used to collect data, analyze data, reflect on the data with the student participants, and develop an action plan to improve students' scholarly activity in the Foundations of Data Analytics course. I am a professor at the university and teach the Foundations of Data Analytics course.

5.2 Statement of the Problem of Practice

Southern New Hampshire University is in the process of creating effective e-learning environments. Students are disengaged in the graduate program in data analytics, and this disengagement is exacerbated by traditional, top-down instruction. This action research study explored and tested the effectiveness of using student-centered methodology within an e-learning environment for a graduate level class in data analytics to enhance students' abilities. The term *abilities* refers to the students' capabilities to apply what is being taught to their personal world. By using student-centered instruction, students should be able to apply the methods more easily as they can relate the theories/concepts to their life. "Student-centered teaching methods shift the focus of activity from the teacher to the learners. These methods include active learning, in which students solve problems, answer questions, formulate questions of their own, discuss, explain, debate, or brainstorm" (Oakley et al., 2004, p. 11). Student-centered classrooms

65

recognize that a student shifts through stages and are designed to cultivate true interests. Educators should create an atmosphere advantageous to learning and encourage the development of students' learning experiences.

5.3 Research Questions

The primary question in this action research Dissertation in Practice (DiP) was "How, if at all, can student-centered instruction increase achievement of students within a graduate level data analytics course in an e-learning environment?" The literature reviewed by me supports environments that enable students to make the connections between school content and their lived experiences. Students become more engaged in their learning when they can relate the material to their lived worlds. When students make this connection, they start to set greater expectations for themselves and, thus, are more likely to reach their highest academic potential. As an educator and as a researcher, it is essential to absorb as much knowledge as possible about how to best improve students' academic abilities.

For this reason, a supporting research question that needed to be examined was "How can educators of graduate students in a data analytics course implement student-centered instruction in the e-learning environment?"

5.4 Purpose Statement

The purpose of the present action research study was to analyze student-centered instruction in the e-learning environment in a graduate level course on data analytics at Southern New Hampshire University. The e-learning technology was structured. The purpose of e-learning is to provide a forum to share information. E-learning provides the platform to be able to communicate and educate individuals through various forms of

66

knowledge. The addition of situated learning experiences enhances the learning process and should be encouraged. This shared communication through technology needs to be properly structured.

The reasoning for e-learning is quite forthright. If the approaches are effective and beneficial, students' perceptions toward using them will be enhanced through the experience. On the contrary, poor experiences lead to changes in perceptions, too, but toward avoidance, which is what we, as graduate educators, are hoping to avoid. I believe there are instructors at the university at the graduate level who design their courses without the slightest idea or notion of how students think and learn. This point of view reminded me of the courses I disliked throughout my e-learning academic career and provided confirmation as to why I disliked them. The courses were not designed in a manner that was favorable to my learning style and, thus. caused a lot of dissatisfaction within some of the courses.

The purpose of e-learning is to provide a forum to share information/knowledge that otherwise may not have the possibility to be shared. E-learning provides the platform to be able to communicate and educate individuals through various forms of knowledge. The addition of situated learning experiences enhances the learning process and should be encouraged. This shared communication through technology needs to be properly structured. When effective collaborative systems such as Adobe Connect, are utilized correctly in an online course, they allow the instructor and students to effectively interact and collaborate, providing a great experience for all involved.

67

5.5 Summary of the Study

This action research study explored and tested the effectiveness of using student-centered methodology within an e-learning environment for a graduate level class in data analytics at Southern New Hampshire University to enhance students' scholastic abilities. Inductive teaching and learning was used in this study and the student participants were assessed on their discussion posts and final projects. The primary question in this action research was: "How, if at all, can student-centered instruction increase achievement of students within a graduate level data analytics course in an e-learning environment?" The literature reviewed by me supports higher educational environments that enable graduate students to make the connections between curricular content and their lived world experiences. Data collection included student achievement and student surveys at the university. The data was analyzed using quantitative and qualitative methods.

In this action research study, the data collected and analyzed from student participants in the student-centered course and the teacher-centered course provides evidence that the student-centered course improves students' scholastic abilities. Most of the student participants in the student-centered e-learning environment received an A or B while most of the student participants in the teacher-centered e-learning environment received an A or C. The average grade for student participants in the student-centered e-learning environment was, 95.76%. The average grade for student participants in the teacher-centered e-learning environment was, 89.83%. There was an outlier that affects the quantitative measures for the teacher-centered e-learning environment. If the study excluded the outlier, the student-centered e-learning environment's grade distribution and

quantitative measures would still be better than the teacher-centered e-learning environment's quantitative measures (See Appendix E and Appendix F for results).

The student participants were able to communicate in the survey with me the strengths and weaknesses of the course. The student-centered e-learning environment received mostly positive responses from student participants for every question of the survey. There were a few student participants that believed the final project required too many case studies. I will consider decreasing the number of case studies from 10 to 8. The teacher-centered e-learning environment received negative responses for parts of the survey. The teacher-centered student participants did not think the assignments and readings were relevant to their life. The course materials were considered to be outdated and bland. The teacher-centered student participants also thought the instructions were not clear and that the page layout and navigation of the course was not easy to follow.

The input from the student participants will help the me improve the e-learning experience for future students in the Foundations of Data Analytics course. The first step in the improvement process for the course is to cut down on the number of required case studies from 10 to 8. This decrease in the number of case studies required for the final project will help students focus on case studies of their interests. This will help keep them engaged in the learning process while also feeling more positively about the work assigned. Iterative design will be used to continuously test, analyze, and refine the Foundations of Data Analytics course. If successful, I plan to use the same iterative design process for the entire analytics program at Southern New Hampshire University to enhance the e-learning experience while also increasing student achievement.

5.6 Suggestions for Future Research

This research has been focused on the student-centered approach versus the teacher-centered approach in an e-learning environment for a graduate data analytics course. There have been many studies completed on the two types of approaches but not many of them were specifically completed for a graduate data analytics course in an e-learning environment. The drastic rise in online graduate programs in analytics has created a need for research.

I conducted this action research study at Southern New Hampshire University because the students were disengaged in the graduate program in data analytics, and this disengagement was exacerbated by traditional, top-down instruction. My belief is that top-down instruction is occurring at most universities that are teaching analytics. Further research is needed to ensure students' needs are being met. Students need to feel excited about learning so that their engagement level increases. As this study indicates, when students are engaged and enjoy the learning process, their level of achievement rises.

Constructing effective online communities provides the opportunity for students to learn how to work with others who may be different from them (i.e., age, race, religion, geography, etc.). An effective online community promotes problem-solving skills and decision-making skills that help students become well-prepared for their lived world. By providing diverse curricula, online graduate analytics programs can help students link the material from theory and concepts to their lived world.

Other organizations in higher education need to offer teachers support.

National organizations with a focus on education could collaborate on a major national project to create a definition of good teaching that could be used by

70

college and universities as they work to promote good teaching. This would need to be shaped in a way that is meaningful across a broad spectrum of disciplines and teaching situations and is still specific enough to distinguish good teaching from mediocre teaching.

Accrediting agencies need to continue a trend that is already in place. This is the policy of encouraging individual colleges and universities to provide evidence that students are achieving significant kinds of learning and that faculty are regularly engaging in professional development activities to learn how to teach as effectively as possible.

Funding agencies in government, corporate, and private organizations fund education-related projects. When these agencies describe the kinds of projects they are willing to fund, it would be helpful if they were to tell applicants to identify the kinds of significant learning that will be promoted in the project and indicate how the proposed activities reflect the principles of effective instructional design, such as active learning and educative assessment.

Disciplinary associations currently support efforts to improve teaching within their discipline in one way or another but these associations could have an even bigger impact on the practice of teaching within their disciplines if their activities reflect the full range of possibilities: offering workshops that relate major ideas on college teaching to discipline-specific situations; sponsoring and organizing research on effective teaching; providing forums (conferences, journals, Websites), in which practitioners can share their teaching concerns, experiments, research, and successes; providing materials (books, papers, videos, CDs) that

71

summarize and synthesize ideas on good practice; and working collaboratively with local institutions and other national organizations to address policy issues that affect teaching.

Journals on college teaching have risen significantly throughout the past few years and this can have a significant impact on the teaching of their readers if the editors, authors, and reviewers kept a few recommendations in mind: relate the article to some of the major ideas in the general literature on college teaching, broaden the focus from specific techniques to broader teaching strategies, and provide information on all the key components of instructional design (situational factors, learning goals, feedback and assessment, teaching and learning activities, and the relationships among these components) (p. 247).

Teachers need support when they are trying to incorporate new methods of instruction. Universities and other higher education organizations need to provide support for teachers so that teachers can provide effective and significant learning experiences for their students. Teachers also need support in making the changes to their current curriculum. Fink (2003) states that "teachers need support when they are trying to incorporate new methods of instruction. Being a good facilitator is much harder and much more time consuming than being a good presenter of information; without considerable support at the institutional level, or significant individual motivation, change won't come easy since faculty (like everybody else) will tend to optimize as best they can their scarce resources of time" (p. 152). Future research can help provide teachers and universities with more insight on what students need to succeed. This action research

study is one step in the right direction but more research needs to be completed to ensure

the results are reflective of the total population of students.

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APPENDIX A

LETTER TO DEAN

Ms. Angela Foss
Dean of STEM Programs
STEM Programs
2500 N. River Road
Hooksett, NH 03106

RE: Permission to Conduct Research Study

Dear Ms. Angela Foss:

I am writing to request permission to conduct a research study at Southern New Hampshire University. I am currently teaching courses in the Master of Science in Data Analytics program at the university. The course that the study will take place is Foundations of Data Analytics. The study is titled, *Student-Centered Approach vs. Teacher-Centered Approach: Which is More Effective in an E-Learning Environment.*"

The student participants are those who will be enrolled in the Foundations of Data Analytics course with me in Summer 2017 (both sections). Data will be collected on the graduate students' submissions in Blackboard. The student surveys will be collected through the university's evaluation site. As you know, both Blackboard and the university collect the data and categorize it into descriptive statistics (overall grade, grade distribution, minimum value, maximum value, range, mean, median and standard deviation). There are also sections in the university's evaluation that allows the student participants to write essay format responses to questions. This information will be collected and reviewed as well. The student participants will remain anonymous.

Your approval to conduct this study will be greatly appreciated. If you have any questions or concerns, please call me or email me.

Sincerely,

Kyle Camac

APPENDIX B

INFORMED CONSENT LETTER FOR EXEMPT RESEARCH

Dear ___,

My name is Kyle Camac. I am a doctoral candidate in the Education Department at the University of South Carolina. I am conducting a research study as part of the requirements of my degree in curriculum and instruction and I would like to invite you to participate.

I am studying the effectiveness of using student-centered methodology within an e-learning environment for a graduate level class in data analytics at Southern New Hampshire University. If you decide to participate, your final grade will be collected and analyzed along with a course evaluation survey. You may feel uncomfortable answering some of the questions in the survey. You do not have to answer any questions that you do not wish to. The survey will take place through Southern New Hampshire University's course evaluation site at the end of the course. Your final grade in the course and your answers to the survey will be collected and analyzed so that I can accurately reflect on your overall experience in the course. Your final grade and the answers to the survey will only be reviewed by me.

Participation is confidential. Study information will be kept in a secure location at the University of South Carolina. The results of the study may be published or presented at professional meetings, but your identity will not be revealed. Taking part in the study is your decision. You do not have to be in this study if you do not want to. You may also quit being in the study at any time.

We will be happy to answer any questions you have about the study. You may contact me at, Camac@email.sc.edu, or my faculty advisor, Dr. Toby Jenkins-Henry, Jenki279@mailbox.sc.edu, if you have study related questions or problems. If you have any questions about your rights as a research participant, you may contact the Office of Research Compliance at the University of South Carolina at 803-777-7095.

Thank you for your consideration. If you would like to participate, please complete the survey at Southern New Hampshire University's course evaluation site.

Best,

Kyle Camac

<center>**APPENDIX C**</center>

<center>**STUDENT-CENTERED COURSE**</center>

Program Description

Today's businesses, government, healthcare organizations, manufacturing operations, and information technology security organizations (among many others) are wrestling with how to effectively leverage "big data" for competitiveness, risk-assessment, mission-critical decision-making, and organizational effectiveness. Data has become increasingly ubiquitous, particularly in unstructured formats and through disparate sources, requiring organizations to become more advanced in the collection, storage, analysis, security, and reporting of data. With demand increasing within organizations to make big decisions with big data, so too does the need for professionals with specialized skills and education in data analytics to fill the talent gap that exists today.

The M.S. in Data Analytics focuses on the strategic and advanced uses of data analytics across a broad range of industries and occupations. Students in the program are engaged in advanced technologies for data mining, visualization, modeling, and optimization while understanding the requirements and needs of the organizational environment through business research and in-depth analysis. The ethical uses of data and ensuring appropriate security measures for data collection and storage are a key feature of the program, and students will engage in advanced techniques for protecting the integrity and privacy of data, organizations, and consumers. The graduate degree

<center>84</center>

program prepares students to position themselves as a strategic asset to any organization by making data immediately beneficial to strategic decision-making for any organization.

*M.S. Data Analytics, Southern New Hampshire University Course Catalog, 2016-2017.

Course Description

We live in a world where substantial amounts of data are available at the touch of a button. While this may be a very empowering prospect, it can also be overwhelming. In this course, students will examine the status of analytics, its impact on the business world, and the career options that may be available as a result. Emphasis will be placed on the verification of data, the role of regulatory organizations, and the privacy and ethics issues that surround its use.

* Foundations of Data Analytics. Southern New Hampshire University Course Catalog, 2016-2017.

Program Outcomes

MS-DAT-CORE-01: Conduct thorough needs assessments using statistical, analytical, and applied research techniques and consult organizational stakeholders on business requirements to offer logical and effective recommendations for data analytics initiatives.

MS-DAT-CORE-02: Protect the integrity and privacy of data, organizations, and consumers through advanced technology solutions and ethical and legal practices in all aspects of the profession.

MS-DAT-CORE-03: Position data analytics as a competitive advantage to organizations by accurately communicating the cost and benefits of data analytics

projects and technologies, as well as the long-term benefits of data-driven decision making.

Course Concept

This course defines the proper uses of data analytics and its boundaries while describing exactly how to approach the various stakeholders within an organization. Incorporated in the course is a review of the ethical, regulatory, and compliance issues related to a given business problem and/or solution. Time is spent interpreting performance-based organizational issues while concurrently identifying solutions for these same performance-based organizational issues. In addition, time is spent identifying the best practices to plan for engaging, implementing, and sustaining organizational change.

* Foundations of Data Analytics. Southern New Hampshire University Course Catalog, 2016-2017.

Course Outcomes

The course outcomes are to

- Articulate the value of data analytics in organizations,
- Select suitable analytic method(s) given a business situation,
- Collect the data necessary for data analytic techniques,
- Formulate solutions for resolving data quality,
- Evaluate the analytic capabilities of an organization,
- Evaluate the ethical issues related to privacy and the use of data and their relevance to the case studies selected, and
- Determine the essential business intelligence architecture elements for analytically oriented organizations.

Summative Assessment

By researching, summarizing, and analyzing real-world situations, you will be able to see first-hand how businesses effectively utilize analytics as a competitive advantage.

Course Project (70 pts.)

Students must complete a final project:

- Case Study Collection – Select 10 Case Studies
- Final Case Study Collection Analysis – Paper, 20 pages (case summaries plus analysis, which includes Data Ethics & Regulations)

There are several milestones throughout the course to prepare students for the expectations of the final project. Each milestone will not be graded. That is, no points will be earned but feedback will be given to ensure students are on track to successfully complete the final project. The feedback provided by the instructor for the milestones must be incorporated into the final project.

Overview

- You will select 10 case studies to summarize and analyze.
- You will research real-world problems, issues, or activities involving data analytics within organizations.
- You will use course concepts presented in the class to help in your analysis of the case studies.
- You will interact with your classmates on the discussion board regarding the course concepts and your case studies.
- You will summarize and analyze each case study on one page (i.e., common problems, applications used for certain circumstances, etc.). *10 pages total
- You will also discuss the issues of data ethics and regulations as it pertains to your case studies. *10 pages total, 1 page for each case
- You will then compile your summaries and analysis into one document to submit for your final project (10 pages total in summaries, 10 pages total in data ethics and regulations).

The case studies can be found for free online. Students can find the case studies by researching the Internet and the library. You can also find case studies by searching these companies' websites: UPS, SAS, IBM, Teradata, and many others.

Required Book

Competing on Analytics, The New Science of Winning by Thomas Davenport & Jeanne Harris

- This book provides insights on companies that utilize analytics that can help you with your discussion posts and the course project. You are more than welcome to use outside resources as well.

Assessment Addresses Course Outcomes:

- Articulate the value of data analytics in organizations
- Select the suitable analytic method(s) given a business situation
- Formulate solutions for resolving data quality
- Evaluate the analytic capabilities of an organization
- Evaluate the ethical issues related to privacy and the use of data and their relevance to the case studies selected
- Determine the essential business intelligence architecture elements for analytically oriented organizations.

Discussion Board Questions (3pts. each for a total of 30pts.)

Week 1 – Introduce yourself and provide some background on your knowledge and experience in analytics.

Week 2 - In today's business environment, many factors can provide a competitive advantage. Why is analytics more or less valuable than other factors? What is the relationship between analytics and other factors (e.g., logistics, cost, or customer retention)?

Week 3 - While there appears to be evidence that businesses competing on analytics are also high performing businesses, how do we know if analytics is the cause of this success?

Week 4 - Is there any situation (other than regulated industries) when competing on analytics would be inappropriate or potentially unsuccessful? Why?

Week 5 - Suppose you are an analytic professional and tasked by your company with developing an analytics program that will evaluate an internal process, resulting in the greatest performance increase to the firm. What process would you choose to address? Why? What techniques might you use to analyze that process?

Week 6 - Should all businesses seek to become analytic competitors?

Week 7 - The prioritization of new analytic initiatives will likely be highly dependent on the business. What factors might influence what initiatives take precedent? As an analytic professional, what might you consider if you were tasked with prioritizing new initiatives for your organization?

Week 8 - Data management is key in moving toward analytic competitiveness. As an analytic professional, what challenges might you face when establishing your organization's data management systems? How might you overcome those challenges?

Week 9 - As an analytic professional, you may face barriers to integration between the technically oriented and strategy oriented environments in your organization. How might you overcome those barriers? Why might they have developed in the first place? What might result if those barriers are not overcome?

Week 10 - Suppose you were an executive in your company. How would you use analytics to help drive and inform strategy development? Who would you consult? What information would you request?

Table C.1 Standard discussion board rubric utilized by the university

Discussion Board Rubric

Critical Elements	Exemplary	Proficient	Needs Improvement	Not Evident	Value
Comprehension	Develops an initial post with an organized, clear point of view or idea using rich and significant detail (18–20)	Develops an initial post with a point of view or idea using appropriate detail (16–17)	Develops an initial post with a point of view or idea but with some gaps in organization and detail (14–15)	Does not develop an initial post with an organized point of view or idea (0–13)	20
Timeliness	Submits initial post on time by Thursday at 11:59 PM EST (10)	Submits initial post by Friday at 11:59 PM EST, one day late (7)	Submits initial post by Saturday at 11:59 PM EST, two days late (4)	Submits initial post by Sunday at 11:59 PM EST, three days late (0–3)	10
Engagement	Provides relevant and meaningful response posts with clarifying explanation and detail (18–20)	Provides relevant response posts with some explanation and detail (16–17)	Provides somewhat relevant response posts with some explanation and detail (14–15)	Provides response posts that are generic with little explanation or detail (0–13)	20
Critical Thinking	Draws insightful conclusions that are thoroughly defended with evidence and	Draws informed conclusions that are justified by evidence (24–26)	Draws logical conclusions (21–23)	Does not draw logical conclusions (0–20)	30

90

	examples (27–30)				
Writing (Mechanics)	Initial post and responses are easily understood, clear, and concise using proper citation methods where applicable with no errors in citations (18–20)	Initial post and responses are easily understood using proper citation methods where applicable with few errors in citations (16–17)	Initial post and responses are understandable using proper citation methods where applicable with a number of errors in citations (14–15)	Initial post and responses are not understandable and do not use proper citation methods where applicable (0–13)	20
				Earned Total	**100%**
Comments:					

Table C.2 Standard project paper rubric utilized by the university

Final Project Paper Rubric

Critical Elements	Exemplary	Proficient	Needs Improvement	Not Evident	Value
Main Elements	Includes all the main elements and requirements and cites multiple examples to illustrate each element (23-25)	Includes most of the main elements and requirements and cites many examples to illustrate each element (20-22)	Includes some of the main elements and requirements (18-19)	Does not include any of the main elements and requirements (0-17)	25
Inquiry and Analysis	Provides in-depth analysis that demonstrates complete understanding of multiple concepts (18-20)	Provides in-depth analysis that demonstrates complete understanding of some concepts	Provides in-depth analysis that demonstrates complete understanding of minimal concepts	Does not provide in-depth analysis (0-13)	20

91

		(16-17)	(14-15)		
Integration and Application	All of the course concepts are correctly applied (9-10)	Most of the course concepts are correctly applied (8)	Some of the course concepts are correctly applied (7)	Does not correctly apply any of the course concepts (0-6)	10
Critical Thinking	Draws insightful conclusions that are thoroughly defended with evidence and examples (18-20)	Draws informed conclusions that are justified by evidence (16-17)	Draws logical conclusions, but does not defend with evidence (14-15)	Does not draw logical conclusions (0-13)	20
Research	Incorporates at least two scholarly/technical resources effectively that reflect depth and breadth of research (14-15)	Incorporates at least two resources effectively that reflect depth and breadth of research (12-13)	Incorporates at least one resource that reflects depth and breadth of research (11)	Does not incorporate scholarly resources that reflect depth and breadth of research (0-10)	15
Articulation of Response	Submission is properly cited, free of errors related to citations, grammar, spelling, syntax, and organization, and is presented in a professional and easy-to-read format (9-10)	Submission has no major errors related to citations, grammar, spelling, syntax, or organization (8)	Submission has major errors related to citations, grammar, spelling, syntax, or organization that negatively impact readability and articulation of main ideas (7)	Submission has major errors related to citations, grammar, spelling, syntax, or organization that negatively impact readability and articulation of main ideas (0-6)	10
				Earned Total	**100%**

Comments:

92

www.manaraa.com

Guidelines: All paper assignments must follow these formatting guidelines: double spacing, 12-point Times New Roman font, 1-inch margins, APA citation and page length requirements.

Table C.3 Grade distribution for the course

Grade Distribution

Assignment Category	Number of Graded Items	Point Value per Item	Total Points
Discussions	10	3	30
Final Project	1	70	70
		Total Course Points:	100

This course may also contain practice activities. The purpose of these non-graded activities is to assist you in mastering the learning outcomes in the graded activity items listed above.

Table C.4 Standard graduate grading system utilized by the university

Graduate Grading System

Total Points: 100				
Grade	Numerical Equivalent	Points	Points Equivalent	
			Lower	Upper
A	93-100	4.00	93	100
A-	90-92	3.67	90	92
B+	87-89	3.33	87	89
B	83-86	3.00	83	86
B-	80-82	2.67	80	82
C+	77-79	2.33	77	79
C	73-76	2.00	73	76
F	0-72	0.00	0	72
I	Incomplete			
IF	Incomplete/Failure*			
W	Withdrawn			

Grading Guides

Specific activity directions, grading guides, posting requirements, and additional deadlines can be found in the Course Information area in the Assignment Guidelines and Rubrics folder.

Table C.5 Weekly assignment schedule for the course

Weekly Assignment Schedule

Module	Topics and Assignments
1	An Introduction to Analytics Read Chapters 1-3, *Competing on Analytics* 1-1 Discussion: Introductions 1-2 Final Project Review
2	Competing on Analytics Read Chapters 4 and 5, *Competing on Analytics* 2-1 Discussion: Competing on Analytics 2-2 Begin Work on Milestone One
3	Analytic Capabilities Read Chapter 6, *Competing on Analytics* 3-1 Discussion: Analytic Capabilities for Organizational Success 3-2 Final Project Milestone One: Introduction
4	Business Analytics Model Read Chapter 7, *Competing on Analytics* 4-1 Discussion: Situational Analytics 4-2 Begin Work on Milestone Two
5	Internal Process Read Chapter 8, *Competing on Analytics* 5-1 Discussion: Internal Process 5-2 Final Project Milestone Two: Cases
6	Analytic Competitors Read Chapter 9, *Competing on Analytics* 6-1 Discussion: Should all companies be analytic competitors? 6-2 Final Project Milestone Three: Ethics and Regulations
7	Prioritizing New Initiatives 7-1 Discussion: Prioritizing new initiatives for your organization 7-2 Final Project Milestone Four: Conclusion

94

8	Data Management
	8-1 Discussion: Data management challenges
	8-2 Continue Work on Final Project
9	Putting It All Together
	9-1 Discussion: Technically oriented versus strategy oriented environments
	9-2 Final Project Submission: Project Proposal
10	Executive Decisions
	10-1 Discussion: How would you use analytics to help drive and inform strategy development?

The Learning Modules area in Blackboard contains one module folder for each week of the course. All reading and assignment information can be found in the folders. All assignments are due by 11:59 p.m. Eastern Time on the last day of the module week.

Attendance Policy

Online students are required to post to the Blackboard discussion board during the first week of class. If a student does not submit a posting to the discussion board during the first week of class, the student is automatically withdrawn from the course for non-participation.

Late Assignments Policy

Meeting assigned due dates is critical for demonstrating progress and ensuring appropriate time for instructor feedback on assignments. Students are expected to submit their assignments on or before the due date.

Diversity and Disability Statement

The university values diversity and inclusion. The university strives to create inclusive and welcoming academic environments. If there are aspects of the instruction or design of this course that present barriers to your inclusion, please notify the Disability

Resource Center (DRC) as soon as possible. We will work with you to address needs and concerns.

We encourage all students with known or suspected physical, medical, sensory, psychiatric, and/or learning disabilities to register with the Disability Resource Center (DRC) in order to assess learning needs and take advantage of available academic accommodations and support services.

Academic Honesty Policy

The university requires all students to adhere to high standards of integrity in their academic work. Activities such as plagiarism and cheating are not condoned by the university.

APPENDIX D

SURVEY QUESTIONS

1. The syllabus is clear and outlines the requirements for the course (1=No, 2=Yes).

2. The grading criteria for the course are clear (1=No, 2=Yes).

3. The assignments, readings, and materials are relevant to the course (1=No, 2=Yes).

4. The instructions for each assignment are clear (1=No, 2=Yes).

5. The page layout and navigation of the course are easy to follow (1=No, 2=Yes).

6. Describe specific things about this course you would change.

7. The instructor demonstrated knowledge of the course content and materials (1=No, 2=Yes).

8. The instructor responded to my questions and concerns within 24 hours (1=No, 2=Yes).

9. The instructor provided helpful responses to my questions and requests (1=No, 2=Yes).

10. The instructor helped me understand the course content and assignments (1=No, 2=Yes).

11. The instructor set clear expectations about the requirements of the course (1=No, 2=Yes).

12. Describe specific things this instructor did well or did not do well.

TEACHER-CENTERED RESULTS

Table E.1 Statistical achievement for students in the teacher-centered class

Student Achievement Results

Count	24
Minimum Value	15.34
Maximum Value	100.00
Range	84.66
Average	89.83
Median	97.06
Standard Deviation	18.05
Variance	325.69

Table E.2 Grade distribution for students in the teacher-centered class

Grade Distribution

Greater than 100	0
90 - 100	18
80 - 89	1
70 - 79	3
60 - 69	1

98

50 - 59	0
40 - 49	0
30 - 39	0
20 - 29	0
10 - 19	1
0 - 9	0
Less than 0	0

Table E.3 Survey results for students in the teacher-centered class

Survey Results

Course: Foundations of Data Analytics   Department: PCE

Responsible Faculty: Kyle Camac   Responses: 24 / 24 (100%)

		Camac, Kyle							--- Survey Comparisons ---			
		Responses (%)			Individual				PCE		All	
Evaluation 2017		YES	NO	N	Mean	Med.	Mode	Std. Dev	N	Mean	N	Mean
Q1	1. The syllabus is clear and outlines the requirements for the course.	100%	0	24	2.00	2	2	0	1.7K	1.94	6K	1.96
Q2	2. The grading criteria for the course are clear.	100%	0	24	2.00	2	2	0	1.7K	1.93	6K	1.94
Q3	3. The assignments, readings and materials are relevant to the course.	0	100%	24	1.00	1	1	0	1.7K	1.94	6K	1.96
Q4	4. The instructions for each assignment are clear.	0	100%	24	1.00	1	1	0	1.7K	1.79	6K	1.85
Q5	5. The page layout and navigation of the course are easy to follow.	0	100%	24	1.00	1	1	0	1.7K	1.96	6K	1.96

Responses: [YES] Yes=2 [NO] No=1

Q6 - Describe specific things about this course you would change.	
Faculty:	Camac, Kyle
Response Rate:	100.00% (24 of 24)

-	I hate the course. I would change everything
-	This course did not provide any real world situations to help me learn.
-	The instructor was great but the course was terribly designed. I would redo the whole course.
-	I would recommend changing this course.
-	I loved the course and wouldn't change anything.
-	Prof Camac was excellent but the course was poorly designed.
-	I couldn't wait for this class to be over. The material was outdated.
-	I hated the course materials
-	The professor was good but the course was not interesting at all.
-	Waste of money
-	The course is well constructed. I cannot think of any specific improvements needed.
-	I would suggest to use a different book or additional supplemental materials.
-	I HATED the course.
-	I could have used more example problems to illustrate what to use when.
-	Use a better textbook.
-	I would update it to make it easier to understand. Kyle did the best he could with what he was given
-	I would say more examples, examples benefit everyone and can certainly help get the ball rolling
-	Despised the course
-	On the site layout, references to other pages on the course blackboard page could be better linked. IE when a paper is assigned in the 'Learning Module' folder for a given module, the link for the rubric for that specific paper could be included.
-	I am glad I made it through the course
-	Clarify assignment requirements, milestones, etc. Update some content, it is a repeat of DAT-500.
-	The syllabus should have been updated and clearer English used for assignments. Too many time students email the professor
-	This course was a waste of money. It repeated the intro course.
-	Much too easy of a course

Evaluation 2017		Camac, Kyle							--- Survey Comparisons ---			
		Responses (%)		Individual					PCE		All	
		YES	NO	N	Mean	Med.	Mode	Std Dev	N	Mean	N	Mean
Q7	1. The instructor demonstrated knowledge of the course content and materials.	100%	0	24	2.00	2	2	0	1.7K	1.96	6K	1.96

Responses: [YES] Yes=2 [NO] No=1

Evaluation 2017		Camac, Kyle							--- Survey Comparisons ---			
		Responses (%)		Individual					PCE		All	
		YES	NO	N	Mean	Med.	Mode	Std Dev	N	Mean	N	Mean
Q8	2. The instructor responded to my questions and concerns within 24 hours.	100%	0	24	2.00	2	2	0	1.6K	1.91	5.5K	1.91
Q9	3. The instructor provided helpful responses to my questions and requests.	100%	0	24	2.00	2	2	0	1.6K	1.91	5.5K	1.91

Responses: [YES] Yes=2 [NO] No=1

Evaluation 2017		Camac, Kyle							--- Survey Comparisons -			
		Responses (%)		Individual					PCE		All	
		YES	NO	N	Mean	Med.	Mode	Std Dev	N	Mean	N	Mean
Q10	4. The instructor helped me understand the course content and assignments.	100%	0	24	2.00	2	2	0	1.7K	1.90	6K	1.89
Q11	5. The instructor set clear expectations about the requirements of the course.	100%	0	24	2.00	2	2	0	1.7K	1.91	6K	1.91

Responses: [YES] Yes=2 [NO] No=1

Q12 - Describe specific things this instructor did well or did not do well.
Faculty: Camac, Kyle
Response Rate: 100.00% (24 of 24)

- The professor explained the assignments well.
- The instructor did everything he good to make the class interesting.
- The feedback from the instructor is valuable.
- The professor was very knowledgeable
- I am not sure if it is the instructor, or the course, but I felt the course was terrible.
- Professor Camac was an excellent communicator, his grading was always speedy, fair, and clear. It was a pleasure to be in his class.
- Amazing response time on submitted assignments and questions. Very supportive overall.
- Very efficient and timely in grading assignments.
- First professor whom replied to emails and graded so quickly.
- Excellent professor. The best I have had but one of the worst classes' content wise ever.
- He provided excellent reminders about due dates and detailed feedback via the evaluation of assignments. He also provided excellent information connecting the course material to the actual data analytics business world and identifying excellent professional development resources.
- Kyle was an excellent instructor
- The instructor always got back to my emails very quickly. I felt supported throughout the course and felt like the course was designed with the student in mind.
- Graded too easily
- The instructor is very knowledgeable in data analytics
- Professor Camac communicated well and graded fairly
- The instructor was good at providing feedback and answering questions.
- The content was bland but the instructor shared his real world experience which helped me learn
- I guess the instructor was good but I was so upset by the course I didn't notice
- The instructor explained unclear concepts well
- N/A
- Adds in his 2 cents, plus ten more cents. Offers a lot in terms of his prior knowledge and experience.
- I liked how he sent emails & or provided announcements a few times a week
- Provided excellent feedback that I could incorporate in my following assignments

STUDENT-CENTERED RESULTS

Table F.1 Statistical achievement for students in the student-centered class

Student Achievement Results

Count	20
Minimum Value	79.31
Maximum Value	100.00
Range	20.69
Average	95.76
Median	97.00
Standard Deviation	5.22
Variance	27.28

Table F.2 Grade distribution for students in the student-centered class

Grade Distribution

Greater than 100	0
90 - 100	17
80 - 89	2
70 - 79	1
60 - 69	0

103

50 - 59	0
40 - 49	0
30 - 39	0
20 - 29	0
10 - 19	0
0 - 9	0
Less than 0	0

Table F.3 Survey results for students in the student-centered class

Survey Results

Course: Foundations of Data Analytics Department: PCE

Responsible Faculty: Kyle Camac Responses: 20 / 20 (100%)

Evaluation 2017		Camac, Kyle							--- Survey Comparisons ---			
		Responses (%)			Individual				PCE		All	
		YES	NO	N	Mean	Med.	Mode	Std. Dev	N	Mean	N	Mean
Q1	1. The syllabus is clear and outlines the requirements for the course.	100%	0	20	2.00	2	2	0	1.7K	1.94	6K	1.96
Q2	2. The grading criteria for the course are clear.	100%	0	20	2.00	2	2	0	1.7K	1.93	6K	1.94
Q3	3. The assignments, readings and materials are relevant to the course.	100%	0	20	2.00	2	2	0	1.7K	1.94	6K	1.96
Q4	4. The instructions for each assignment are clear.	100%	0	20	2.00	2	2	0	1.7K	1.79	6K	1.85
Q5	5. The page layout and navigation of the course are easy to follow.	100%	0	20	2.00	2	2	0	1.7K	1.96	6K	1.96

Responses: [YES] Yes=2 [NO] No=1

Q6 - Describe specific things about this course you would change.

Faculty: Camac, Kyle

Response Rate: 100.00% (20 of 20)

- I enjoyed this course so I wouldn't change a thing

- This course was difficult but I wouldn't change it

- I would suggest cutting down on the amount of case studies due

- I liked the assignments and that we got to choose the topics for them. I wouldn't change anything.

- The professor was great and so was the material. N/A to changing anything.

- I found this course to be useful since we could see what were are learning in action (case studies).

- Course exceeded expectations and I enjoyed the variety of challenges.

- I didn't like the text book but everything else was great

- I enjoyed the course a lot. I wouldn't change anything.

- Nothing

- The course is well constructed. I cannot think of any specific improvements needed.

- N/A

- Nothing

- Data analytics is difficult to learn but the professor set up videos to provide examples.

- None

- No suggested changes.

- Nothing as such

- The topics in this course were not new for me, but I still learned a lot because of the final project using case studies

- I enjoyed the discussion questions in this course than previous courses because I was able to utilize what I have learned and apply it to my own life.

- This class was excellent.

Evaluation 2017		Camac, Kyle								--- Survey Comparisons ---			
		Responses (%)		Individual						PCE		All	
		YES	NO	N	Mean	Med.	Mode	Std Dev		N	Mean	N	Mean
Q7	1. The instructor demonstrated knowledge of the course content and materials.	100%	0	20	2.00	2	2	0		1.7K	1.96	6K	1.96

Responses: [**YES**] Yes=2 [**NO**] No=1

Evaluation 2017		Camac, Kyle								--- Survey Comparisons ---			
		Responses (%)		Individual						PCE		All	
		YES	NO	N	Mean	Med.	Mode	Std Dev		N	Mean	N	Mean
Q8	2. The instructor responded to my questions and concerns within 24 hours.	100%	0	20	2.00	2	2	0		1.6K	1.91	5.5K	1.91
Q9	3. The instructor provided helpful responses to my questions and requests.	100%	0	20	2.00	2	2	0		1.6K	1.91	5.5K	1.91

Responses: [**YES**] Yes=2 [**NO**] No=1

Evaluation 2017		Camac, Kyle								--- Survey Comparisons ---			
		Responses (%)		Individual						PCE		All	
		YES	NO	N	Mean	Med.	Mode	Std Dev		N	Mean	N	Mean
Q10	4. The instructor helped me understand the course content and assignments.	100%	0	20	2.00	2	2	0		1.7K	1.90	6K	1.89
Q11	5. The instructor set clear expectations about the requirements of the course.	100%	0	20	2.00	2	2	0		1.7K	1.91	6K	1.91

Responses: [**YES**] Yes=2 [**NO**] No=1

Q12 - Describe specific things this instructor did well or did not do well.
Faculty: Camac, Kyle
Response Rate: 100.00% (20 of 20)

-	The professor went out of his way to make sure I understood the material.
-	I liked how I was able to choose what I wanted to do on the assignments.
-	The instructor enjoys teaching and you can tell by the way he teaches.
-	I enjoyed the environment of this course because the instructor made it open and free
-	Great professor with very good knowledge of the subject and gives instant replies to questions or emails.
-	The professor provided constructive feedback that helped in my learning.
-	The instructor was very supportive in every aspect of the course
-	The professor was consistent and thorough on all of the assignments
-	Immediate feedback and grading on all questions and assignments
-	I like how the professor sent weekly emails to remind me of the assignments due each week
-	The instructor was very positive in his feedback even when I was lost on an assignment
-	This professor is the most attentive I have had at SNHU
-	The professor enjoys teaching which makes it a great atmosphere to learn
-	Best professor
-	The instructor is a very effective communicator
-	Kyle was very quick in grading assignments and answering questions.
-	The instructor was very present in the class, answering questions and responding to discussions quickly. Assignment grading was completed in a very timely manner and the feedback was helpful.
-	Insanely fast at replying and grading.
-	Professor Camac is always very responsive to questions and concerns. He gives constructive feedback on homework and papers. One night, we discussed one of my concerns. He never once made me feel like I was bothering him or my issues were not relevant. He spent time with me until I understood the topic. I hope to take other courses with this instructor.
-	The instructor went above what was expected to teach this class. I enjoy working with him.