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# Student Performance in Cardiopulmonary Pathophysiology at Rockingham College Comparing Distance to Face-to-Face Instruction

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STUDENT PERFORMANCE IN CARDIOPULMONARY PATHOPHYSIOLOGY AT  
ROCKINGHAM COMMUNITY COLLEGE COMPARING DISTANCE TO FACE-  
TO-FACE INSTRUCTION

A Research Paper Presented to the Faculty of the  
STEM Education and Professional Studies Department  
of Old Dominion University

In Partial Fulfillment of the Requirements for the Degree of  
Master of Science in Occupational and Technical Studies

By

Vickie Chitwood

August, 2012

**APPROVAL PAGE**

This research paper was prepared by Vickie Chitwood, under the direction of Dr. John M. Ritz, in SEPS 636, Problems in Occupational and Technical Education. It was submitted as partial fulfillment of the requirements for the Master of Science in Occupational and Technical Studies.

Approved by: \_\_\_\_\_ Date: \_\_\_\_\_

Dr. John M. Ritz  
Advisor

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Vickie Chitwood

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## CHAPTER I

### INTRODUCTION

The use of distance learning was nonexistent in the Respiratory Therapy Program until the Spring Semester of 2012 at Rockingham Community College in Wentworth, North Carolina. The faculty expressed concern with student learning outcomes. The faculty felt students would not attend class on-line; however, they would attend a face-to-face class.

Face-to-face instruction has students in the classroom with a teacher. The instructor may choose many avenues to deliver the required material. An advantage of face-to-face instruction is the presence of an instructor to facilitate the learning process. Disadvantages include availability of space, time, and faculty.

Distance learning enables a student to take a class and perform the required assignments without the constraints of a classroom day and time requirement. Advantages include the student may work the class into their personal daily schedule and financial consideration would be decreased with less time on campus. A disadvantage of distance learning is the requirement of the student to have access to high speed internet and proper knowledge of the computer software platform.

As time and space requirements became a burden for the faculty and college, the suggestion was made that Cardiopulmonary Pathophysiology could be taught on-line. Investigating student performance through both on-line and face-to-face instruction for this class will prepare the faculty to better serve the students in the Respiratory Therapy Program.



## **STATEMENT OF PROBLEM**

The problem of this study was to determine the effectiveness of student achievement in Cardiopulmonary Pathophysiology Respiratory Therapy enrolled in Rockingham Community College's distance learning system compared to face-to-face delivery to assess the learning potential of distance delivery.

## **HYPOTHESES**

This study will analyze how students respond to distance learning instruction in the Respiratory Therapy Program at Rockingham Community College. Factors influencing distance learning or live instruction in the curriculum will be explored. These factors include:

H<sub>01</sub>: Changing instruction from a face-to-face format to a distance learning format will have no affect on effectiveness of instruction in relation to student outcomes.

H<sub>02</sub>: Changing a face-to-face course to a distance learning course does not affect student attendance.

## **BACKGROUND AND SIGNIFICANCE**

Rockingham Community College is located in Wentworth, North Carolina. The Respiratory Therapy Program faculty was interested in knowing if a course offered on-line would have a negative, positive, or no impact on the overall student learning outcomes. The effect of offering a class on-line versus face-to-face instruction was of concern.

Distance education is a form of instruction which is imparted mostly indirect and mainly belongs to adult education (Malik & Rahman, 2010). According to Smith, Gilham, McCutcheon, and Ziaian (2011), given the widespread and increasing uptake of online delivery and concurrent technological change, there is enormous scope to improve learning and teaching, particularly if pedagogy can drive the on-line delivery process. This need to consider an online teaching-learning environments and its role in a good feedback practice or the enhancement of self-regulating learning is a pressing issue (Puyal & Miguelanez, 2011). This study will attempt to explain the need for on-line learning in the Respiratory Therapy Program.

The importance of this study is based on the need to provide the data required to the faculty of the Respiratory Therapy Program regarding the effectiveness of on-line learning. According to Puyal and Miguelanez (2011), the creation of resources on virtual platforms, such as Moodle, has proved to allow a better adjustment to the changes inevitably brought by the competency-based approach and the use of information and computer technologies in the classroom.

### **LIMITATIONS**

Limitations of this study must be addressed and include the following:

- This study was limited to one Respiratory Therapy on-line course.
- This study was limited to Rockingham Community College.
- This study was limited to one on-line instructor.
- This study was limited to one on-line course in a single semester.
- This study was limited due to new on-line computer learning software platform.

- The study will compare attendance and grades earned for the on-line delivery to a face-to-face class.

### **ASSUMPTIONS**

This research project was based on the following assumptions:

- The course content was designed for specific Respiratory Therapy classes.
- The instructor was trained in proper use of computer technology and Moodle.
- The students were trained in proper use of technology and Moodle.
- The internet was accessible to all students.
- The students wanted to be in class to learn Respiratory Therapy.
- There will be no difference in learning success of students as shown through the literature and reports of other researchers.

### **PROCEDURES**

The experimental method of research will be used in this study. Attendance and final grades will be collected for face-to-face instruction and distance education instruction. Grades will be compared in both methods of instructional delivery. Attendance in distance education will be tracked by student log-ins and from an attendance roster in face-to-face instruction. The data will be collected and analyzed to determine the effectiveness of student achievement in Cardiopulmonary Pathophysiology Respiratory Therapy students in a distance education course by using end of class grades. The researcher will be provided the data anonymously by the course instructors.

## DEFINITIONS

The following definitions are provided to assist the reader in understanding this study:

- **Cardiopulmonary Pathophysiology:** this course introduces the etiology, pathogenesis, and physiology of cardiopulmonary diseases.
- **On-line:** an online course delivered exclusively via the internet.
- **Distance Learning:** is a formal educational process in which the majority of the instruction occurs when student and instructor are not in the same place, but not always online.
- **Respiratory Therapy:** is a healthcare profession in which specialists work with patients suffering from acute or chronic pulmonary or cardiac disease.
- **Moodle:** is a course management system, also known as a learning management system. It is a free web application that educators can use to create online learning sites.

## OVERVIEW

Chapter I will seek to explore and determine the effectiveness of student achievement in Cardiopulmonary Pathophysiology Respiratory Therapy. Students will be taught on-line instruction versus face-to-face instruction. However, a limitation of the study is that the on-line course has only been offered one semester. Therefore, data results will be minimal.

Chapter II will offer a Review of the Literature focusing on student outcomes in the two learning environments. This subject offers a variety of point of views; therefore,

it is critical to review existing literature. Current examples of distance learning strategies will be proposed to investigate the significance of distance learning versus face-to-face learning.

Chapter III focuses on methods and procedures used to obtain data for the study. This section will focus on survey data distributed, collected, and analyzed. Chapter IV offers an interpretation of the data assimilated.

To conclude, Chapter V will summarize the research material and offer conclusions and recommendations based upon the findings. Future research may be needed based upon the conclusions of the findings.

## **CHAPTER II**

### **REVIEW OF LITERATURE**

Since implementation of distance learning is a developing trend for educational programs, this review was conducted to provide insight and understanding of distance learning as it relates to education and student learning outcomes. The emerging agenda for modernization and technological change in health services places a significant imperative upon flexible, tailored, and timely methods of delivery of learning to healthcare professionals (Carroll, Booth, Papaioannou, Sutton, & Wong, 2009).

There are numerous factors to consider when deciding to offer a course online. In general these include course material, instructor training, and technology platform. The literature of this chapter will cover (1) an overview of distance education, (2) barriers to distance education, and (3) student motivation and outcomes.

### **OVERVIEW OF DISTANCE EDUCATION**

According to Malik and Rahman (2010), distance education is a form of instruction which is imparted mostly indirect. In distance education, the students are given the opportunity to pursue their studies in accordance with their particular needs. In the United States there are thousands of students earning degrees either entirely or partially online, with little or no need to attend on-campus classes or meet personally with instructors (Beard & Harper, 2002). Over five and a half million college students (nearly 30% of all college students) are now enrolled in online courses (Allen & Seaman, 2010). In the Spring of 2012, Rockingham Community College offered eleven degrees, certificates, or diplomas with at least half of the classes available online (RCC, 2012).

Research by Malik and Rahman (2010) supports flexibility in distance education, effective planning and organization is needed for desired objectives, and discussion was the main learning element lacking in distance education.

Health care education programs are typically high cost due to student-faculty ratio, clinical rotations, accreditation requirements, and expensive laboratory equipment. As stated by Carr and Swanson (2000), health care programs are taxing to educational institutions but are greatly needed in our communities. The refinement of technology combined with societal demands has made distance learning a legitimate choice for many people. A great deal of people want to attain a college education but cannot leave their employment or family to complete the necessary degree work. In fact, many online learners are older than traditional college students and have jobs and families (Simonson, Smaldino, Albright, & Zvacek, 2003).

Distance learning offers a different learning environment than face-to-face lecture. Communication and non-verbal communication are greatly affected by the medium (Carr & Swanson, 2000). Acquiring and maintaining attention is more difficult.

Advantages to distance learning include the capability to access course materials at convenient locations and times. Distance learning can add depth to a course. “Specific benefits include forcing them to read the textbook and spend time on the material each week rather than just before a test” (Riffell & Sibley, 2003, p. 397). Distance education classes have an additional advantage of being able to link directly to supplemental information located at web sites. Instructors can make such online “field trips” a valuable part of the learning experience (Tuthill & Klemm, 2002, p. 453).

## **BARRIERS TO DISTANCE EDUCATION**

Several barriers exist that may impede the learning atmosphere in distance education. Access to hardware, software, and high-speed internet primarily in rural areas may prevent students from enrolling in distance education courses. The technology may be a barrier. “The vulnerability of institutions to computer virus attacks and the lack of ability to quickly remedy an attack are potentially serious problems for online courses” (Rittschoff & Griffin, 2003, p. 135). In addition to viruses, many courses require additional software to complete an assignment, project, and test. This software may be incompatible with existing software, creating a financial hardship as well as a time management concern. It is important for both students and faculty to be flexible and expect the unexpected.

Sense of community in an on-line course is often a barrier faced by many instructors. Rovai (2002) described community within an educational environment as enhanced cohesion among students. Even though students may be geographically separated they develop a sense of obligation to each other’s success. A sense of community allows students to learn from one another, build a professional relationship, and gather support beyond the faculty member (Fiege, 2011). According to Woods, “... faculty-student and student-student communication within group formats is just as important when it comes to positively influencing student perceptions of and participation in online learning than personal communication that occurs outside formats” (Woods, 2002, p. 386). Absence of the social and interactional atmosphere from the traditional “live” classroom may also contribute to low attendance rates (Abrami & Bures, 1996).



Communication online requires increased clarity and direction from the instructor for the delivery of written materials. Unclear instructions were cited by many students as one of the reasons for experiencing frustration with online courses (Youngblood, Trede, & De Corpo, 2001). Another source that could be a direct concern of attendance problems in distance education is "... linked to technology that has surfaced in some students comments about frustration resulting from equipment design or function problems, such as poor sound, or an inability to see or speak with the instructor" (Horton, 2000, p. 15).

### **STUDENT MOTIVATION AND OUTCOMES**

"Student satisfaction is critical to the success of tele-education programs because positive attitudes directly influence a variety of important student-and-program related variables" (Biner et al., 1997, p. 25). Life events, financial anxiety, and institutional dynamics are variables that influence student attitudes.

Distance education should offer enhanced technology, high achievement expectations, and interpersonal skills for students to be successful and motivated learners. "One way to achieve these objectives is to increase the overall amount and kind of learner interaction with the instructor, with peers, and with course content" (Abrami & Bures, 1996, p. 41).

Learners that are highly motivated generally will perform at an enhanced level than learners with low motivation. In the case of online learning, many times students who take a course online are already motivated to a higher degree than their on campus counterparts (Shea, Motiwalla, & Lewis, 2001). One study determined that motivation,

more than delivery method, determine student outcomes, "... students with similar learning strategy and motivation performed equally well irrespective of Web or lecture format" (Kankaran & Bui, 2001, p. 197). Therefore, outcomes would be comparable in either delivery method.

Brown (2001) articulated that online students believe they are responsible not only for their own learning but also for the learning of classmates. Inman, Kerwin, and Mayes (2008) in a review of eleven community college online courses found student interaction with course activities and materials were more of a significant predictor of student satisfaction than direct interaction with a faculty member. Marzelli and Dicker (2006) were surprised at how students clamor for community development in online courses, especially when students in face-to-face courses are more motivated when class is dismissed. Therefore, it is important to find a balance for students to be able to manage online material (Northrup, 2002).

## **SUMMARY**

This chapter provided a review of literature pertaining to current practices in distance education. An overview of distance education was provided focusing on the increased number of students learning online. It was revealed numerous barriers to distance education exist. Barriers consisted of hardware, software, and accessibility of high-speed internet. Other distinctive barriers included sense of community, lack of communication, and attendance.

Student motivation and attitude contribute to learning outcomes. Learners with high incentives generally perform at a greater intensity than learners with low motivation. In distance education students must find a balance for success.

Chapter III will clarify the instruments, methods, and procedures used in the collection of data for this study. The population studied will be identified and an explanation of the analysis of the data will be provided.

## **CHAPTER III**

### **METHODS AND PROCEDURES**

This study is an experimental study that seeks to determine the effectiveness of student achievement in Cardiopulmonary Pathophysiology Respiratory Therapy. The students were enrolled in Rockingham Community College's distance learning system and will be compared to face-to-face delivery to assess the learning potential of distance delivery. Chapter III will identify the population of this study, the type of instrument design used, and data collection and analysis.

### **POPULATION**

The population for this study consisted of two full-time Respiratory Therapy classes. Sixteen Respiratory Therapy students were enrolled in Cardiopulmonary Pathophysiology via distance education, and 24 Respiratory Therapy students completed the class in a face-to-face instruction modality. All students were enrolled in the Respiratory Therapy Program. The population included females and males between the ages of 17 and 60; full-time students; single and married individuals; employed part-time, full-time or unemployed.

### **RESEARCH VARIABLES**

The research variables in this study consisted of one independent variable and two dependent variables. The independent variable was the method of instructional delivery-distance or face-to-face. The dependent variables were attendance and academic performance.

### **INSTRUMENT DESIGN**

The study was completed using data supplied by the instructors of Cardiopulmonary Pathophysiology. Final grades and attendance rosters were provided by the face-to-face instructor. Final grades and student log-ins were provided by the on-line instructor. All student identification was removed from the data and were coded by the letter A (face-to-face instruction) or B (distance education) to assure anonymity. Final course grades were compared for the course offered online and in the traditional classroom by the same instructor. Grades for each class were collected from Datatel, Rockingham Community College's grading management system by the course instructors. According to the Respiratory Therapy website (2011), students must complete each course with a "C" or better to demonstrate competency.

### **DATA COLLECTION PROCEDURES**

Student grades for Respiratory Therapy Cardiopulmonary Pathophysiology were obtained from Datatel, the grading software management system. Data were supplied by course name, section code, and semester the course was offered and whether it was taught face-to-face (A) or by distance learning technologies (B). All identification information of students was removed. Class GPA's were compared to the section taught by the same professor in face-to-face lecture and online instruction. The data supplied were used to compare learning outcomes.

## **STATISTICAL ANALYSIS**

Attendance and final grades were compared using the t-test method of statistical analysis to determine whether a significant difference existed in the two methods of delivery.

## **SUMMARY**

Chapter III provided information on the methods and procedures used in this study. The study's population and variables were defined, and methods of data collection were outlined. The population was drawn from enrolled students at Rockingham Community College's Respiratory Therapy Program. Final course grades and attendance in on-line and face-to-face teaching delivery were compared. A two-tailed level of significance was used to analyze the data. Statistical analyses were calculated for the t-test for significance. Chapter IV, Findings, will discuss the results of the study.

## **CHAPTER IV**

### **FINDINGS**

The problem of this study was to determine the effectiveness of student achievement in Cardiopulmonary Pathophysiology Respiratory Therapy enrolled in Rockingham Community College's distance learning system compared to face-to-face delivery to assess the learning potential of distance delivery. This chapter presents the statistical analysis of the data that were collected from the research.

### **GRADE ANALYSIS**

The means of 24 students in face-to-face lecture and 16 distance education students were collected and calculated using a t-test to determine statistical significance. Appendix A states the system of grading scale at Rockingham Community College. The final grades of the face-to-face students were averaged and used in the t-test calculation as data group one is shown in Appendix B. The final grades of the distance education students were averaged and used in the t-test calculation for data group two, Appendix C. The t-test calculation was used to determine if there was a statistical significance difference between grades of students in the traditional classroom and students in a distance learning setting. The average grade of the face-to-face students was 2.75. The average grade for distance education students was 3.87 as shown in Table 4.1. The test is a two-tailed test because it has a null hypothesis. The t-value was 5.11. The degree of freedom was 38. The value for a degree of freedom of 38 for the critical value of t was  $>2.70$  at the .01 level of significance.

Table 4.1

*Final Grades*

<b>Student</b>	<b>N</b>	<b>Mean</b>	<b>Standard Deviation</b>
<b>Face-to-Face</b>	24	2.75	15.97
<b>Distance Learning</b>	16	3.87	3.87

### ATTENDANCE ANALYSIS

The sample means for attendance of 24 students in face-to-face lecture and 16 distance education students were collected and calculated using a t-test to determine statistical significance for attendance. The attendance records for face-to-face students were averaged and used in the t-test calculation as data group one. The log in records were averaged and used in the t-test calculation as data group two, as shown in Appendix D. The t-test calculation was used to determine if there was a statistical significance between attendance of students in the traditional classroom and students in distance learning setting. The attendance for face-to-face students consisted of five absences in a sixteen week period. The distance learning students consisted of zero absences in a sixteen week period, Appendix E. The t- test is a two-tailed test because it has a null hypothesis. The t-value was 2.043. The degree of freedom was 38. The value for a degree of freedom of 38 on the critical value at 0.5 level of significance was 2.021. See Table 4.2.



Table 4.2

*Attendance*

<b>Student</b>	<b>N</b>	<b>Mean</b>	<b>Standard Deviation</b>
<b>Face-to-Face</b>	24	4.8	.2
<b>Distance Learning</b>	16	0	0

### SUMMARY

This chapter presented the collected data and calculated results in order to determine if there was a difference between grades and attendance of face-to-face students and distance learning students in Cardiopulmonary Pathophysiology. The sample means were compared and analyzed using t-test calculations to determine if a statistical significance existed. Chapter V will present conclusions based on the statistical analysis and recommendations for the future will be offered.

## **CHAPTER V**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

This chapter will review and summarize the research that was conducted and draw conclusions regarding the data obtained through the study. Recommendations for the use of the data will be discussed. Further use of research projects will be recommended.

#### **SUMMARY**

The problem of this study was to determine the effectiveness of student achievement in Cardiopulmonary Pathophysiology Respiratory Therapy enrolled in Rockingham Community College's distance learning system compared to face-to-face delivery to assess the learning potential of distance delivery. The hypotheses stated prior to data collection were:

H<sub>01</sub>: Changing instruction from a face-to-face format to a distance learning format will have no affect on effectiveness of instruction in relation to student outcomes.

H<sub>02</sub>: Changing a face-to-face course to a distance learning course does not affect student attendance.

T-tests were used to determine if a relationship existed between face-to-face student final grades and attendance compared to distance learning students. The population studied consisted of two Respiratory Therapy classes. Sixteen Respiratory Therapy students were enrolled in Cardiopulmonary Pathophysiology in distance education, and 24 Respiratory Therapy students completed the class in a face-to-face instruction modality. All students were currently enrolled in the Respiratory Therapy

Program. The population included females and males between the ages of 17 and 60, they were full-time students, there were single and married individuals and some were employed part-time, full-time, or unemployed.

## CONCLUSION

Following were the conclusions based on the data collected:

H<sub>01</sub>: Changing instruction from a face-to-face format to a distance learning format will have no affect on effectiveness of instruction in relation to student outcomes. The t-value was 5.11. The degree of freedom was 38. The value for a degree of freedom of 38 and the critical values of t at the .01 level was  $p > 2.704$ . This value exceeds the confidence level at the .01 level. Therefore, the researcher was justified in accepting the hypothesis and assuming that there is no difference in student learning effectiveness, as displayed by final grades, in relationship to learning format.

H<sub>02</sub>: Changing a face-to-face course to a distance learning course does not affect student attendance. The t-value calculated was 2.043. The degree of freedom was 38. The value for a degree of freedom of 38 on the critical values of t was at the 0.5  $p > 2.021$ . This t-value does exceed the level of .05 confidence. Therefore, the researcher would be justified in accepting the hypothesis and assuming there is no difference in student attendance in face-to-face lecture and distance education format. Although learning delivery differs, the results of this study indicate there is no difference in academic success in face-to-face and distance learning formats. Therefore, both settings offer equal opportunities for effective and successful student outcomes.

## RECOMMENDATIONS

Distance education is rapidly increasing and this technology will play a role in future educational program effectiveness. The following recommendations are made for further studies in the area of distance and face-to-face education:

1. Distance learning students must have access to all learning resources (libraries, computers, etc.) as on-campus students do.
2. Faculty must stay current on software technology for distance and face-to-face instruction.
3. Other studies should be conducted comparing distance learning and face-to-face students in the Respiratory Therapy Program for other courses.
4. All students must participate in learning platform management system training before enrolling in a distance learning class.
5. Studies should be conducted concerning student attitudes, interest, and backgrounds in relationship to distance learning.
6. Studies should be conducted concerning faculty attitudes, interest, and backgrounds in relationship to distance learning.

The researcher recommends that Rockingham Community College continue to offer and develop the distance learning component of the Respiratory Therapy Program. Rockingham Community College should continue to recruit highly motivated individuals to participate in the Respiratory Therapy Program courses offered in face-to-face and distance learning modalities.

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**APPENDIX A**  
**SYSTEM OF GRADING SCALE**

Rockingham Community College

Letter Grade	Grade-point equivalence
A	4.0
B	3.0
C	2.0
D	1.0
F	0.0



**APPENDIX B**  
**FINAL GRADES CARDIOPULMONARY PATHOPHYSIOLOGY**  
**FACE-TO-FACE LECTURE**

<b>SAMPLE</b>	<b>GRADE</b>
1	B
2	A
3	B
4	C
5	C
6	B
7	A
8	D
9	C
10	B
11	B
12	B
13	C
14	A
15	C
16	B
17	C
18	B
19	A
20	C
21	C
22	C
23	A
24	B

**APPENDIX C****FINAL GRADES CARDIOPULMONARY PATHOPHYSIOLOGY****DISTANCE LEARNING**

<b>SAMPLE</b>	<b>GRADE</b>
1	A
2	A
3	A
4	A
5	A
6	A
7	A
8	A
9	B
10	A
11	A
12	A
13	B
14	A
15	A
16	A

**APPENDIX D****ATTENDANCE CARDIOPULMONARY PATHOPHYSIOLOGY****FACE-TO-FACE LECTURE**

<b>SAMPLE</b>	<b>DAYS MISSED</b>
1	0
2	0
3	0
4	0
5	1
6	1
7	0
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	0
16	1
17	0
18	0
19	1
20	0
21	0
22	0
23	1
24	0

**APPENDIX E****ATTENDANCE CARDIOPULMONARY PATHOPHYSIOLOGY****DISTANCE EDUCATION**

<b>SAMPLE</b>	<b>DAYS MISSED</b>
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	0
16	0