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The Effectiveness of Web Support to Increase Student's Performance in Advertising and Promotion

Jennifer D. Lanz
Old Dominion University

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**THE EFFECTIVENESS OF WEB SUPPORT TO
INCREASE STUDENT'S PERFORMANCE
IN ADVERTISING AND PROMOTION**

A STUDY PRESENTED TO THE GRADUATE FACULTY OF
THE DEPARTMENT OF OCCUPATIONAL
AND
TECHNICAL STUDIES
OLD DOMINION UNIVERSITY

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF MASTER OF SCIENCE

BY

JENNIFER D. LANZ

JULY 2001

APPROVAL PAGE

This project was prepared by Jennifer D. Lanz under the direction of Dr. John Ritz in OTED 636, Problems in Occupational and Technical Studies, as partial fulfillment of the requirements of the degree of Master of Science in Occupational and Technical Studies.

Date 7-20-01

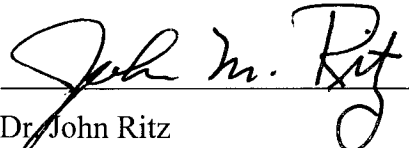
Approved By 
Dr. John Ritz
Advisor and
Graduate Program Director

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CHAPTER I

INTRODUCTION

The Internet has been one of the most amazing changes in our lives. People are using interactive media technologies and virtual reality to solve problems. Technology has changed the workplace in such ways as how to get information and how the work gets organized and completed. The ability to connect people and exchange information faster has changed the way people think and learn.

There is research about the importance of technology for corporate success. The increased and intelligent use of technology has become critical for the continuing economic development of organizations (Marquardt, 1999, p. 9). Technology has also added to greater achievements in education. It has been shown to have positive effects on the instructional process and on basic and advanced learning skills (Kosakowski, 1998). According to the American Association of School Administrators, ninety-four percent of all teachers and superintendents believe that technology has improved student learning. The Internet offers new opportunities for students and teachers to learn in interesting ways (Ellsworth, 1994, p. xxiii).

One way of using technology is to use the computer as a teaching aid or assistance to class instruction. It can benefit every student because all learning styles will be reached with the computer, therefore all learning styles can respond. The Internet can be used as a tool for students to collaborate on projects, pursue an individual interest or communicate with other students. Having a web page for a course allows students to take responsibility for gathering

their own information. Gathering information for the class can be done independently by the student or the teacher can post pertinent course information on a web page.

Teachers are using web pages to support their courses. A web page can simply be a resource about the teacher and the course or it may be very elaborate. An elaborate web page can include note taking guides for lectures, assignments, a semester calendar, lists of additional resources, on-line discussions, links to related information and an additional way of communicating. Assignments that enhance students' computer skills can be incorporated into regular curricular offerings (Zeszotarski, 2000).

While web pages would automatically seem to be a benefit for students, it is difficult to measure their influence on student learning to determine their instructional effectiveness. This study will compare a course taught without the use of a web page to the same course taught with the use of a web page. It is important to investigate how much a web page can assist learners since there is an understanding of the new development of technology and the encouragement of the use of technology in coordination with education.

STATEMENT OF THE PROBLEM

The problem of this study was to determine the effectiveness of web support to increasing student performance in Advertising and Promotion at Old Dominion University.

RESEARCH GOAL

The following hypothesis was used in this study:

H₁: Students who have access to web support study materials will out perform students academically in Advertising and Promotion at Old Dominion University than students who did not have access to web support materials.

BACKGROUND AND SIGNIFICANCE

Advertising and Promotion was a course taught by the Department of Occupational and Technical Studies at Old Dominion University. Two sections of this course were offered each semester. The Fall 2000 courses were taught using in class lectures and activities based on the textbook Advertising Procedure, 14th Edition, by J. Thomas Russell and W. Ronald Lane. Students were required to purchase a course-pak that included syllabus information, project assignment descriptions and review questions for each chapter. The Spring 2001 courses were taught using the same textbook, however, information about the course and all of the materials were posted on a web site. Students could access the web site to obtain note taking guides, project assignments, calendar information, and visit links that related to class material. This allowed the integration of a tremendous amount of information from other sites that were appropriate to the content area (Barron, 1997). Students could also communicate with other students and the teacher about a particular topic on the discussion page.

The researcher was interested to find out if the web page assisted the student's learning in the course. The scores for tests, projects, an ad campaign and final grades will be compared. By creating a web site for the course and encouraging the students to use it, they could take advantage of the information available to them on the World Wide Web. The other benefit was having a resource of information that was presented in class in case a student was absent. By having a discussion page, students could post their opinions on a topic and read what others have suggested. It allowed students to become active in the learning process.

Students of all ages learn better when they are actively engaged in the learning process. The instructor thought that the web pages would encourage more students to become active learners and therefore perform better in the course. The results of the study could show that the students performed the same or one group performed better than the other did.

This is important because all teachers want their students to succeed. While the effort is placed on the student, assistance from the teacher is important. The most common type of assistance today is personal and technological assistance. Today's students have grown up using computers and multimedia devices. Most of them are communicating through instant messaging services or e-mail. It seems appropriate to use technology to learn and share information for school.

Learning technologies indicate that the use of electronic technologies to deliver information facilitates the development of skills and knowledge (Marquardt, 1999, p. 58). Technology can be used to present information or distribute information. This study focuses on the distribution of information. The benefits of using learning technologies described by

Marquardt are that they are learner-controlled, cost effective, user friendly, accessible from a distance, hands-on, uniformed in content, motivate students to learn, can be easily updated, meet multiple learning styles, and information is available as needed. The instructor was hoping that the web site would meet all of these benefits and increase student success.

Similar restructuring of teaching is very common. Teachers in all areas of study have web pages for their courses and classes are taught from distant sites and via the World Wide Web. Using technology is a challenge for schools and educational institutions. One reason that technology is a challenge is the cost. It is very expensive to start and maintain. Secondly, schools have to employ people that know how to use the technology. New teacher training and staff development topics have focused on technology so teachers can use it in the classroom more.

There is some objection to this idea that using technology will increase success. Teachers seemed to be doing a fine job presenting information before the use of the Internet and they feel they still do today. Despite student's desire for technology, many college professors refuse to use it for their classes as a result of the stress and anxiety that it causes. This belief comes from people that have not learned how to use technology. Other critics believe that money is being taken away from groups such as the performing arts and it is being spent on technology (Oppenheimer, 1998). Another idea is that schools will not effectively use technology even when it is provided and encouraged. Educators must accept technology as a necessary tool. If they wish to prepare their students, then they must make sure technology plays a part in the education they receive today (Higdon, 1999).

LIMITATIONS

The limitations of the study are identified as follows:

1. This research studies only one course, Advertising and Promotion.
2. The number of courses compared were two in each format; two courses were supported by web materials and two were not.
3. This study did not measure the possible differing characteristics such as age, educational level, gender, or prior knowledge between the experimental group and the control group.
4. The instructor did not use the supplemental test items provided by the publisher. She designed them on her own.
5. The instructor has never worked for an advertising agency and this is the first year she taught at a university.

ASSUMPTIONS

The following assumptions are assumed to be true:

1. The educational backgrounds of the students were diverse.
2. Some students had previous experience in advertising and/or promotion.
3. All students desired instruction in Advertising and Promotion.

4. All students in the experimental group knew how to use the Internet and had access to the Internet.
6. The same textbook was used for the experimental group and the control group.
5. All students in the experimental group used the class web pages and visited them frequently to get material for class.

PROCEDURES

This is a quasi-experimental study on the assistance of a class web page on student performance in Advertising and Promotion. It was conducted at Old Dominion University in Norfolk, Virginia. Two sections of the course were offered each semester. The two fall classes were the control group and the two spring semester classes were the experimental group. The researcher instructed all four sections of the course. The textbook used for all four sections was Advertising Procedure, 14th Edition, by J. Thomas Russell and W. Ronald Lane. All of the students received the same instruction, project assignments and tests. The experimental group had access to a web site created by the teacher. The web site included syllabus information, note taking guides, a semester calendar, links to related course information, assignments, and a discussion page. The students were encouraged to use the web site throughout the semester.

Data were collected for student test grades (3), project assignments (5), and an ad campaign. These were averaged into a final grades. The data were collected from approximately 100 students in a traditional classroom setting. Approximately 50 students

were in each group. The classes were conducted according to Old Dominion University's schedule. Each group received classroom lecture, group activities and assignments that explored concepts learned in class. The scores of the control group and the experimental group will be compared. The researcher was looking for an improvement in the experimental group's grades.

DEFINITION OF TERMS

The following terms were used throughout this report and the list of definitions will clarify their significance to this study.

1. Internet – a loose confederation of computer networks around the world that are connected through several primary networks (Marquardt, 1999, p. 59)
2. World Wide Web – all of the resources and users on the Internet using Hypertext Transport Protocol (Marquardt, 1999, p. 60)
3. E-mail – the exchange of messages through computers (Marquardt, 1999, p. 59)
4. Advertising and Promotion – a introductory course designed to teach the fundamental product and service promotion processes of planning and producing advertising and promotion campaigns (Old Dominion University Course Catalog, 1999, p. 240.

SUMMARY

This study was undertaken to determine if web pages could assist in the performance of students in Advertising and Promotion. The study was conducted at Old Dominion University during the 2000 – 2001 school year. With the new opportunities that the Internet offers, it was important to test its usefulness to education. Chapter I of this research provided the framework for the research problem. It identified the research goals, the assumptions used to conduct the research and the limitations of the project. Chapter I also discussed the origin of the study, the importance of doing the research, and specific terms used by the researcher.

The remaining chapters in this report will identify other studies that have been conducted by researchers and literary works related either directly or indirectly to this topic. The researcher will also describe the methods and procedures used to collect the data and provide an analysis of the study. The report will summarize the contents of this report and will make suggestions for future research studies.

CHAPTER II

REVIEW OF LITERATURE

The goal of this study was to collect and analyze data related to the influence of the use of a web page on student learning. In order to understand the study, it was necessary to review certain topics prior to reviewing and evaluating the data collected in the study.

The Review of Literature focused on several issues. The researcher reviewed pertinent literature and investigated the importance of technology for corporate success, the use of a computer as a teaching aid or assistant, the impact of a web page on student learning, and examples of teachers using web pages to support classroom instruction. This section concludes with a summary of the literature.

IMPORTANCE OF TECHNOLOGY FOR CORPORATE SUCCESS

The workplace today is made up of more technological advancements and innovations than ever before. We have information highways, networks, virtual reality and digital communication services. The impact of technology on organizations has been wonderful. It has made the work easier and faster. The problem is that there are not enough workers that know how to use the technology. Computer skills are essential for employment. The growing need for workplace learning has occurred because of the changes caused by technology and the tremendous increase in global competition. Providing workers with the knowledge and skills necessary to understand and to compete has become staggering (Marquardt, 1999, p. 10).

Corporate recruiters for Cornell University in Ithaca, New York, surveyed corporate leaders for the computer competency skills they expect in college graduates. Word processing, spreadsheet, graphics/presentation, and basic database skills were ranked highest in a list of 23 competencies (Davis, 1997). Schools have the responsibility to prepare students with technological skills needed for the workplace.

The use of technology by students is an example of real world productivity. Other than just word processing skills, databases and spreadsheets, presentation programs, multimedia authoring tools, e-mail, video production equipment and network search engines help students complete tasks that they may have to perform in jobs after college. Many new and existing jobs require students to have high levels of technical skills at the start. These kinds of jobs are better paying and give better job satisfaction (Johnson, 1998). Organizations need to process the rapidly growing amount of information. The Occupational Outlook Handbook for 2000-2001 states that workers with expertise in appropriate computer software applications should have the best job prospects.

THE USE OF A COMPUTER AS A TEACHING AID OR ASSISTANCE

The World Wide Web has a lot to offer education and it can be used in several different ways. The World Wide Web can be used as a communication tool, resource for information gathering, a presentation method and fun practice. Students at any age can gather information and engage in personal interests.

Using the Web as a communication tool saves time. Teachers can send e-mail to students about an assignment or upcoming event and students can ask questions for a quick

response. Teachers can also use chat sessions in their classroom to talk to pen pals in other schools to learn more about other places in the world.

Access to the Web allows access to an enormous amount of news and information which is instantly available. The availability of information prompts students to show initiative and ask their own questions (Johnson, 1999). Not only is information available to the students, but web sites have also been created for teacher resources and education materials. No other medium can offer such broad, inexpensive delivery as the World Wide Web (Barron, 1997).

Colleges and corporations conduct courses partially or wholly through the Web. New Promise, a Web site that tracks Internet-based college and university courses, listed over three thousand courses from over one hundred accredited schools. On-line learning in the last few years has exploded in popularity (Delima, 1999). Until recently, schools relied on traditional print instruction materials and audio and videocassettes. Some of the advantages of access to the Web are inviting, geographical screen layouts, interactive multimedia learning materials and simplified access and searching of databases (Owston, 1997). Today's children have grown up with the computer using it for entertainment and learning. Most students are visual learners and prefer to learn on the Web.

THE IMPACT OF A WEB PAGE ON STUDENT LEARNING

New technologies allow students to have more control over their own learning, to think analytically and critically, and to work collaboratively (Kosakowski, 1998). These benefits come from technology being fun and easy to learn. Students feel more successful in

school and are motivated to learn and have increased self-confidence and self esteem when using technology to learn (Bialo & Sivin-Kichala, 1996). This is true in many subject areas and for special needs students.

Apple Computers conducted a ten-year project where students and teachers were given computers and they report that students became socially aware and more confident, explored and represented information dynamically, became independent learners and self-starters, worked well collaboratively and used technology routinely and appropriately (Dwyer, 1994). Positive effects come from using technology. Students tend to show an increase in writing skills, better understanding of the subject, ability to teach others and greater problem solving and critical thinking skills. Technologies, such as Web access, make enormous amounts of news and information instantly available, prompting students to show initiative and ask their own questions (Johnson, 1999).

There is not one significant way to deliver instruction. The Web, when used as a tool, is likely to improve learning in a significant way. The Web appeals to student's learning modes. It provides flexible learning and enables new kinds of learning (Owston, 1997). It becomes a resource for students who miss class and need assignments. The Web also gives students direct access to more information on a subject if necessary. The Web can offer a lot more than information to students. It increases their developmental skills such as critical thinking and problem solving (Owston, 1997).

EXAMPLES OF CURRENT USE

The World Wide Web provides a unique opportunity for educators to create a variety of rich online learning environments (Dringus, 1995). The Web has a lot to offer education and there are many examples of current use. One example is at Acadia University in Canada. A study took place that measured traditional learning track to a class track that used information technology. The students that are in the information technology track have shown a 20% improvement of grades (Pearsall, 1998).

Another example is the University of Nevada. A study was done to investigate college student's use of instructor created web sites. The study measured how many teachers had web sites for their courses, how often students used them and what purposes they were being used for. The studies found that students were using instructor's web sites and were used for homework assignments, class schedules, relevant sites and lecture notes (Chandler & Maddux, 1998).

SUMMARY

The Review of Literature examined the importance of technology for corporate success, the use of a computer as a teaching aid or assistance, the impact of a web page on student learning, and examples of current use of web pages by teachers. Web assisted education is a powerful tool to boost student learning and access to information.

The advantages of a teacher to reduce photocopying, ability to update the syllabus and posting new information are not as endless as the advantage for students. Using technology, students can develop better skills in critical thinking and problem solving. It is not a shortcut method to learning, but rather a resource to learning.

Chapter III includes an outline of the research methods and statistical procedures used by the researcher to evaluate the success of students in Advertising and Promotion at Old Dominion University.

CHAPTER III

METHODS AND PROCEDURES

This chapter describes the research methods and statistical procedures used to collect and analyze the data from an Advertising and Promotion class at Old Dominion University. A quasi-experimental study was conducted to gather information from student grades of four sections of a course for the 2000-2001 school year. Included in this chapter are sections on population, instrument design, methods of collecting data, statistical analysis, and a summary.

POPULATION

The population used in this study consisted of all of the Advertising and Promotion students at Old Dominion University for the 2000-2001 school year. A control group and an experimental group were used in this study. The study was conducted with undergraduate students enrolled in two Fall semester courses and two Spring semester courses. The control group consisted of 48 students that enrolled in the Fall 2000 semester and the experimental group consisted of 46 students that enrolled in the Spring 2001 semester that had access to course web pages designed by the instructor.

There were a total of 92 undergraduate students that ranged from freshmen, sophomore, junior, and senior status. Students attended school full-time or part-time. They enrolled in this course as an elective or it was required for their major. The students' ages

ranged from 18 to 45. All of the students had access to a computer either at home or at school.

CLASSROOM PROCEDURES

The classes at Old Dominion University were conducted in a classroom in the Technology Building. The instructor used class lecture, video presentation, discussion, and individual and group activity assignments throughout the course. Each student was required to take three exams, complete five individual projects and a group campaign. The instructional textbook used for both semesters was Advertising Procedure, 14th Edition, by J. Thomas Russell and W. Ronald Lane.

Each group had the same instructor, used the same textbook and had the same assignments and tests. The experimental group had access to a web page designed by the instructor that consisted of outlined lecture notes, study guides, project assignments, semester calendar, links to class resources and an e-mail link to the instructor.

INSTRUMENT USE

The instruments used to measure student learning were grades on three different exams, five individual projects, a group campaign and their final average. In all class sections, students were subjected to the same questions, grading scale, task assignments and expectations. The instructor created all of the tests and project assignments. The instructor

administered all tests and projects. The instruments were designed to measure the students' knowledge and understanding of the subject matter.

METHODS FOR COLLECTING DATA

Students' scores that were recorded throughout the 2000-2001 school year in the instructor's grade book were collected as data for this study. The three exams were given throughout the semester, one in the beginning, middle and end. The five projects were assigned every three weeks throughout the semester. Two-thirds of the way through the semester, students were divided into groups of 4 or 5 to work on an advertising campaign proposal. All of the scores were averaged into a final grade that the students received on their official transcripts.

STATISTICAL ANALYSIS

After the data for the study was collected, it was entered into a Microsoft Excel database. One record was established for each group. The records were statistically analyzed using a t-test for student learning. The scores for each grade opportunity were used to calculate the sample means. The sample means of the experimental and control group values of a t-test for a one-tailed test were used to determine significance.

SUMMARY

The research methods and statistical procedures described in Chapter III included the population, instrument design and methods for collecting data. The research instruments used in this study were test grades, project grades and final averages. Statistical data obtained from each research instrument will be analyzed. Additionally, findings derived from each research instrument will be compared. This approach provides the necessary data to address the research goals of the problem under study. The results of the statistical analysis will be discussed and compared in Chapter IV.

CHAPTER IV

FINDINGS

The purpose of this study was to determine if there was a significant difference in the learning success of students who had access to web support and students who did not. The data and the results of the research have been reported in the form of a table with an explanation provided of the methodology used to calculate the research findings.

The research goal was to test the following hypothesis:

H₁: Students who have access to web support study materials will out perform students academically in Advertising and Promotion at Old Dominion University than students who did not have access to web support materials.

In order to test this hypothesis, the researcher needed to have sufficient and verified data from the instructor including number of students in each class and final grades. All of the data were available to the researcher on May 5, 2001. The information provided was sufficient for the researcher to calculate the findings.

ANALYSIS OF DATA

The findings were based on data collected from 92 students enrolled in Advertising and Promotion at Old Dominion University. The Final Grades were compared. The average final grades for the control group (M₁) and experimental group (M₂), were 88.75 and 87.22 respectively (See Appendix A). The t-ratio was found to be 1.125 (See Figure 1). The degree

of freedom ($N_1 + N_2 - 2$) was 90 and level of significance for a one-tailed test at the level of significance was 1.652.

Table 1

	Control Group, M₁	Experimental Group M₂	t-Ratio
Final Grades	88.75	87.22	1.125

SUMMARY

Chapter IV documented the findings for the study. The results of the measurement were given. The data were collected from 92 students, an experimental group and a control group (48 students were in the control group during Fall semester, 46 in the experimental group during Spring semester). A t-test was performed on final grades. Chapter V includes the summary, conclusions and recommendations of this study.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The problem of this study was to determine the effectiveness of web support to increasing student performance in Advertising and Promotion at Old Dominion University. This chapter summarizes the study, draws conclusions based on the findings and recommendations are made for further study.

SUMMARY

This study recognized the effectiveness of web based support in an undergraduate college course. The study was conducted to determine if web support would increase student performance. The researcher acknowledged the impact of technology today, especially the Internet, in education.

This quasi-experimental study was conducted during the 2000-2001 school year at Old Dominion University in Norfolk, Virginia. Four sections of Advertising and Promotion were used to conduct the study. The control group consisted of two sections in the Fall semester and the experimental group consisted of two sections in the Spring semester. The control and experimental group used the same text, had the same instructor and were graded on the same assignments. The experimental group had access to web pages created by the instructor that consisted of note taking guides, current events, related links, a calendar, and a discussion page. A total of 92 students participated in the study, 48 students were in the control group during Fall semester, 46 in the experimental group during Spring semester.

The data was compiled from the final grades that the instructor recorded at the end of the semester as an average of test scores and assignments. A t-test ratio was calculated for performance and the level of significance for a one-tailed test was compared at the .05 level of significance.

CONCLUSIONS

The following hypothesis was used in this study:

H₁: Students who have access to web support study materials will out perform students academically in Advertising and Promotion at Old Dominion University than students who did not have access to web support materials.

Based on the data collected from 92 students enrolled in Advertising and Promotion at Old Dominion University for the 2000-2001 school year a t-ratio was calculated. The t-test result was 1.125 and it did not exceed the .05 level of 1.652 on the table of critical values for a degree of freedom of 90. Based on this significant value, the researcher must reject the hypothesis. There was not a significant impact on student performance based on the final grades from students who had access to course web pages compared to those who did not.

RECOMMENDATIONS

1. This study was completed with 92 Advertising and Procedure students. Future studies should incorporate a larger population and be conducted in other subject areas.

2. A follow-up study should be conducted to evaluate attitudes and opinions of the students that are enrolled in classes with web support.
3. An important issue is technical skill. A future study should measure student's technical skill and poll how much they used the web support materials.
4. An additional study could be conducted to evaluate the motivation level of students in classes with web support.

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APPENDICES

APPENDIX A	Final Grades
APPENDIX B	t-Ratio Calculations
APPENDIX C	Critical Values of t

APPENDIX A

Final Grades

OLD DOMINION UNIVERSITY ADVERTISING AND PROCEDURE

FALL SEMESTER	CONTROL GROUP		SPRING SEMESTER	EXPERIMENTAL GROUP	
FINAL GRADE	d	d2	FINAL GRADE	d	d2
95	6.25	39.0625	82	-5.217391304	27.22117
80	-8.75	76.5625	97	9.782608696	95.69943
99	10.25	105.0625	93	5.782608696	33.43856
76	-12.75	162.5625	90	2.782608696	7.742911
92	3.25	10.5625	87	-0.217391304	0.047259
93	4.25	18.0625	87	-0.217391304	0.047259
100	11.25	126.5625	80	-7.217391304	52.09074
84	-4.75	22.5625	92	4.782608696	22.87335
93	4.25	18.0625	91	3.782608696	14.30813
92	3.25	10.5625	92	4.782608696	22.87335
94	5.25	27.5625	79	-8.217391304	67.52552
92	3.25	10.5625	80	-7.217391304	52.09074
95	6.25	39.0625	89	1.782608696	3.177694
92	3.25	10.5625	81	-6.217391304	38.65595
80	-8.75	76.5625	93	5.782608696	33.43856
94	5.25	27.5625	83	-4.217391304	17.78639
77	-11.75	138.0625	94	6.782608696	46.00378
88	-0.75	0.5625	84	-3.217391304	10.35161
80	-8.75	76.5625	93	5.782608696	33.43856
92	3.25	10.5625	79	-8.217391304	67.52552
80	-8.75	76.5625	81	-6.217391304	38.65595
74	-14.75	217.5625	94	6.782608696	46.00378
84	-4.75	22.5625	77	-10.2173913	104.3951
94	5.25	27.5625	89	1.782608696	3.177694
95	6.25	39.0625	86	-1.217391304	1.482042
80	-8.75	76.5625	84	-3.217391304	10.35161
98	9.25	85.5625	89	1.782608696	3.177694
80	-8.75	76.5625	87	-0.217391304	0.047259
94	5.25	27.5625	89	1.782608696	3.177694
90	1.25	1.5625	93	5.782608696	33.43856
90	1.25	1.5625	85	-2.217391304	4.916824
85	-3.75	14.0625	95	7.782608696	60.569
80	-8.75	76.5625	90	2.782608696	7.742911
91	2.25	5.0625	91	3.782608696	14.30813
98	9.25	85.5625	85	-2.217391304	4.916824
76	-12.75	162.5625	83	-4.217391304	17.78639
85	-3.75	14.0625	94	6.782608696	46.00378
89	0.25	0.0625	78	-9.217391304	84.9603
96	7.25	52.5625	77	-10.2173913	104.3951
86	-2.75	7.5625	81	-6.217391304	38.65595
91	2.25	5.0625	91	3.782608696	14.30813
92	3.25	10.5625	92	4.782608696	22.87335
99	10.25	105.0625	97	9.782608696	95.69943
95	6.25	39.0625	76	-11.2173913	125.8299

FALL SEMESTER	CONTROL GROUP		SPRING SEMESTER	EXPERIMENTAL GROUP	
FINAL GRADE	d	d2	FINAL GRADES	d	d2
80	-8.75	76.5625	95	7.782608696	60.569
87	-1.75	3.0625	87	-0.217391304	0.047259
97	8.25	68.0625			
86	-2.75	7.5625			
SUM	4260	2393	SUM	4012	1593.826
MEAN	88.75		MEAN	87.2173913	

APPENDIX B
t-Ratio Calculations

$$t = \frac{M_1 - M_2}{\sqrt{\left(\frac{\sum d^2_1 + \sum d^2_2}{N_1 + N_2 - 2}\right) \left(\frac{N_1 + N_2}{N_1 \times N_2}\right)}}$$

$$t = \frac{88.75 - 87.22}{\sqrt{\left(\frac{2393 + 159.83}{92}\right) \left(\frac{94}{2208}\right)}}$$

$$t = \frac{1.53}{\sqrt{\left(\frac{3986.83}{92}\right) \left(\frac{94}{2208}\right)}}$$

$$t = \frac{1.53}{\sqrt{43.43 \times .043}}$$

$$t = \frac{1.53}{\sqrt{1.86}}$$

$$t = \frac{1.53}{1.36}$$

$$t = 1.125$$

APPENDIX C
Critical Values of t

Table II Critical Values of t

df	Level of significance for one-tailed test					
	.10	.05	.025	.01	.005	.0005
	Level of significance for two-tailed test					
	.20	.10	.05	.02	.01	.001
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.598
3	1.638	2.353	3.182	4.541	5.841	12.941
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.5771	3.365	4.032	6.859
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.405
8	1.379	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.861	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.717	2.069	2.500	2.807	3.767
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690

28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.659
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.291