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A Study to Determine the Effect of Web-based Information on Improving the Knowledge of Automotive Students at Danville Community College

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A STUDY TO DETERMINE THE EFFECT OF WEB-BASED INFORMATION ON IMPROVING THE KNOWLEDGE OF AUTOMOTIVE STUDENTS AT DANVILLE COMMUNITY COLLEGE

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SIGNATURE PAGE

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CHAPTER I

INTRODUCTION

Today's automotive classroom at Danville Community College has a wide array of students. Many different ability levels, experience, age, and gender can provide a great diversity of populations to teach. This requires new techniques to help reach all the students. If an automotive instructor decided to require students of an automotive electricity class to do a research project on "hybrid electric vehicles" on the road today, most would find little information at the campus library. They would view this as a very unpleasant experience.

The Internet is becoming more common in many homes and classrooms. Many technology educators are resisting the new technology available. The Internet contains much more information on automotive related subjects than any library available to students. If the researcher trains students on some basic Internet search skills, it can open a new world of information to them. The research project on "hybrid electric vehicles" would be a lot more fun for the student. If the task is fun, the student will learn and retain more.

This researcher can use the Internet as a tool to teach both computer literacy skills and at the same time add much new automotive information to the classroom. This will also

stimulate student interest levels that will continue outside the classroom. It can be a step toward having an automotive student become a lifelong learner.

STATEMENT OF PROBLEM

The problem of this study was to determine the effect of Web-based information on improving the knowledge of automotive students at Danville Community College. Data will be compared using assessment scores from 1998 students to 1999 students. The data will be used from electrical/electronic and computerized fuel control automotive systems classes.

HYPOTHESES

The following hypothesis will guide this study:

H_1: Danville Community College automotive students who used the Internet as part of instruction in 1999 will achieve better test and exam scores which will lead to higher final grades in electrical and computerized fuel control classes than students in the same classes in 1998 who were not taught Internet search skills.

BACKGROUND AND SIGNIFICANCE

This study arose from the fact that most libraries, public or college/university, have very little current information available to the study of automotive technology. The increasing high cost of textbooks and the fact that much of the information is out of date by the time

it reaches the students, adds to the lack of information available on campus. Using the Internet in the classroom can be a great addition. Over the years automotive students have struggled to gain information to keep them on the cutting edge of technology.

This study will also address a portion of the Virginia Community College System computer literacy skill's requirement. As outlined by the Virginia Community College System, all students will have to be taught basic computer and Internet skills. This can be taught and reinforced through automotive technology.

Observation has shown that most learners can absorb about one to one ½ hours of new information per day. Learning also means that they will be able to retain and apply that information. Studies also show that to assure that students can use the new information that they must have another five to seven hours of practice (hands on) time to apply the information to retain it. What we do to enhance the retention period is critical. (Roach, 1998)

The Internet can be an information jungle to many students. Guiding students to quality information that is relevant is important. As an instructor, this researcher needs to develop students into life long learners. They should be capable of cutting a path even through information jungles, so instructors must be careful to allow them to use some imagination. This study will show that the use of the Internet to explore the world wide web in an automotive classroom will greatly expand the students' knowledge base and potential. (McKenzie, 1997)

Automotive classrooms have typically lacked in the use of the Internet as many other areas have been given funding for computer access before technology programs. Automotive students have also not been given research assignments since the base of information available to them has been lacking at best. This researcher feels automotive students can gain additional knowledge through the use of the Internet as a research tool. It also is a great tool for gaining more interest and participation in the classroom. Internet research can open many volumes of information allowing automotive students to gather research data on different topics within a particular automotive area and can add a great deal of information to an automotive course.

Automotive electronics and computer operated systems technology are growing at a much faster rate than the information in textbooks alone or library reference material is available to the student. As well as bringing up the level of instruction to automotive students, the instructor can stay on top of technology as well. All of these should continue to build the knowledge of individual students enrolled in the program.

LIMITATIONS

This study will be bound by the following topics:

- The study will present data of 1998 to 1999 Danville Community College Automotive Analysis and Repair students.

- The study will focus on automotive electrical/electronic and computerized fuel control systems training areas.
- The amount of information available in 1999 on the Internet in these areas of electrical/electronic and computerized fuel control systems exceeds that available to previous classes of students as a learning tool.

ASSUMPTIONS

This study will assume that:

1. Students will have a much larger information base in which to expand their knowledge and horizons.

   This assumption is that the Internet has a much larger selection of relevant, up to date, information than the automotive student can find in a text or in a college library and comes from direct experience of the researcher. All the libraries this researcher has been in contain very little up to date automotive technical information.

2. Automotive students do not typically enjoy doing classroom activities as well as they do hands on lab projects.

   This assumption is based on the experience of the researcher in the six years of teaching automotive students in a community college. The information retention rates are very low in a lecture class setting. New medium in the classroom will

raise the level of retention according to this researcher and stimulate more student involvement.

3. Increased student learning will be achieved through the use of the Internet in the automotive classroom. Students will achieve higher exam scores.

The researcher will use a very similar assessment for the 1999 students as he did in the 1998 classes. This researcher predicts an improvement in higher level comprehension as well as students more willing to do research on automotive topics.

PROCEDURES

Data to support the findings of the study will take on several different forms. The final exams in automotive electrical and fuel control courses will remain exactly the same from 1998 to1999. The researcher will analyze the data compiled with relation to 1998 and 1999 exam scores.

The researcher will use the Internet to supplement many of the lecture and classroom activities as they relate to the subject matter being covered. Many web sites can provide great graphics to replace overhead slides and to enhance the textbooks being used.

DEFINITION OF TERMS

The following terms are used in this study:

Automotive student- This term refers to students in the Danville Community College Automotive Analysis and Repair Program in the years noted as 1998 or 1999.

Digital Multimeter- This term refers to a digital read out type of electrical test meter used to measure values such as voltage, amperage, and resistance.

Computerized fuel systems- The computer processor and associated electronic components used in a modern automobile to control the fuel and emission control systems.

Internet - The Internet is made up of well over 100,000 interconnected networks in more than 100 countries covering commercial, academic, and government endeavors. The Internet has become an information highway providing information on every subject known to humankind.

Scan tools- These are hand held computer system analyzers used by an automotive technician or student to read the data within the processor. They can help the individual diagnose a vehicle that is not operating properly.

OVERVIEW OF CHAPTERS

Chapter I provides an overview of this study. It will investigate how the use of the Internet will make a positive difference in the Danville Community College Automotive Program. The study will be limited to data collected in the Automotive Analysis and Repair Curriculum in the electrical/electronic and fuel control system areas of instruction.

Classroom and lab evaluation results will be compared from the 1998 and 1999 classes. A Review of Literature will be used in Chapter II to analyze ways that the use of the Internet in the classroom has been effective in other areas.

The analysis of the data and summary, conclusions, and recommendations will be covered in the final chapters. The amount of information available to today's automotive student and instructor will be shown and data will be analyzed to determine if it aids student learning. Important questions as to the use of the Internet in a technical program will be answered. The reader will also find that using the Internet in an automotive program can stimulate students and enhance their learning experience.

CHAPTER II

REVIEW OF LITERATURE

There is a great amount of information available regarding integrating and using the Internet in the classroom. There is, however, not a great deal of information on the use of the Internet in a vocational technical classroom. This review of literature will be based on the basics of integrating the Internet in a classroom situation. The use of this medium should enhance the knowledge of computer operation and create a much larger knowledge base for automotive students in a community college setting. This should impact the automotive classroom. Currently there is much support for students to use the Internet as they study in the Virginia Community College System.

The purpose statement of this project shows the lack of current automotive related knowledge available to the automotive students through traditional sources. The most current textbooks have information that is at least one year old at the best by the time it reaches the classroom. Many textbooks also do not cover certain topics in depth. (Mills, 1998) The experience of this researcher is that in the automotive technology field it is more than two or three years behind as a reference source. Much information is outdated by the time the textbook reaches the classroom.

INTEGRATING THE INTERNET INTO AN AUTOMOTIVE CLASSROOM

Students need to learn the basis of using the Internet before it is integrated into a curriculum or course. Many students will come to the classroom with basic Internet and information search skills, while others have little or no experience. The students with little or no skills can lead to a great deal of frustration if they do not receive some basic training before searching for information for a class assignment. (Hargittai, 1997)

Learning to search the World Wide Web is a very important part of using the Internet. Students must be taught good skills in using search engines. James Sheldon (1999) uses these criteria he believes are important in searching the World Wide Web.

- Technical Aspects: Does the site load rapidly? Does the multimedia enhance the value of the site? Can the site be easily read? Is the site up to date?
- Organization: Is the site organized in a logical fashion? Does it have a guide of what is available? Does the site have dead ends that lead nowhere?
- Quality: Is the site well written? Is the information useful and relevant?
- Links: Are high quality links provided? Are links provided throughout the site? Does the link list enhance the site?
- Reliability: How reliable is the site information? Is contact information provided? Does advertising get in the way of the purpose of the site? Has the site been evaluated by an outside source? Does the site charge a fee for access?

There are many sites on the Internet to provide new users with basic operating skills.

Teachers should direct students to these sites, or better yet, provide them with the basics in the classroom.

The Internet can be used to find data collected by government or public interest groups. A good example of this in the automotive field would be using the Environmental Protection Agency site to find out the latest regulations and issues concerning the repair of automotive air-conditioning systems. Teachers are the main source of wisdom on any particular topic or concept. The limits of the teachers knowledge on the particular subject may limit the opportunities for the students to learn. The Internet allows a more expert opinion by someone who has specialized knowledge. (1998, Mills)

Why should educators in vocational and technical programs use the Internet? The use of the Internet in the classroom has many positive aspects. Reinforcement is a concept that this researcher saw in much of the information in this review of literature. The other big factor that was repeated many times was that the content is current and comprehensive.

Many teachers do not integrate the Internet into a classroom of vocational students. Teachers from a non-computer related background worry that they will not be able to master the technology. "Surveys, however, have shown that fear is the main reason many teachers shy away from the Internet and why they tend to ignore the computer revolution that is spreading rapidly into all areas of daily life." (Meloni, 1997) Gretchen Lee, a private school teacher in Campbell, California, on the other hand believes non-

traditional teachers are more likely to use the Internet. Are automotive teachers non-traditional as a group? This researcher believes this in relation to the arts and sciences. Vocational educators have found that a teaching philosophy that favors student participation over lectures is more likely to use the Internet in the classroom. This leads to the concept known as constructivism. (Mendels, 1998)

The concept of constructivism in teaching leads the teacher to be more of a facilitator than an instructor. Students are encouraged to take more control of their course of study than in conventional classrooms. They work more in teams and on long term projects. In a vocational training setting, instructors have used this method in laboratory projects for a long time. The Internet can now facilitate this in an automotive classroom.

There is an Internet site this researcher found at goracing.com. It is called the Performance Professor. This year old form of Internet teaching is geared to performance enthusiasts to teach fundamentals in a monthly column. In assessing the first year of this project, the "professor" discovered the level and intensity of Internet students was somewhat higher than he has experienced over years of reading print media news letters. (McFarland, 1999)

IMPROVED LEARNING

There is a great deal of information on the Internet to support the fact that classroom use of this media improves learning. A statewide evaluation survey in the Fall of 1997 of the electronic classroom in the state of Idaho resulted in 73% of the respondents indicating the Internet has enhanced student learning. Comments in the survey included improved opportunities for learning and authentic assessment, making content more relevant to students, and greater access to outside resources. Students in rural areas can use the Internet to find specific materials related to their program, such as automotive specifications. Students can also us the web to enhance their career opportunities. (Dirkson, Bauer, Coffland, & Naylor, 1998)

Internet use both in and out of the classroom has been increasing at astounding rates. This can only connect the need for the media in the classroom. A CNN/USA Today/ Gallop Poll in April 1997 found 99% of a national survey of 744 teenagers used the Internet at least once. Of these, 67% lived in a household with computer access. 87% of those surveyed used the net for class assignments a higher number of times than those that have computers at home. The projection is that in the United States and Canada will reach 38.2 million computers in the year 2000 up from 9.5 million in 1995. (Jipson, 1997)

In a 1998 article, Mendels states: " The Internet will be capable of projecting a rich educational experience in a highly diversified learning environment. The World Wide Web will offer a least restrictive educational environment for the non- traditional student." (Mendels, 1999) Approaching the year 2000, this has proven to be a valid prediction.

SUMMARY

If the schools are to prepare students for the job market, whether it be automotive or medicine, the need to teach basic electronic media skills is essential. Knowing how to access information, analyze data, and communicate with others are essential for students entering all jobs. With the continued complexity of today's vehicles, well-trained technicians need to be able to access new information constantly. The use of the Internet in an automotive classroom is now critical. Christopher Dede stated that "if all computers were to disappear tomorrow, education would be the least affected of society's institutions." (Hargittai, 1997)

CHAPTER III

METHODS AND PROCEDURES

The purpose of this experimental study was to determine the effect of Web-based information on improving the knowledge and performance of automotive students at Danville Community College. In order to determine whether the student performance has improved, it will be necessary to compare final exam grades between the 1998 class and the 1999 class in the same course areas. In this chapter, the population, research variables, classroom procedures and statistical data analysis will be presented.

POPULATION

To begin to conduct this experimental study, it was necessary to select a population to compare the data. The population of this study was comprised of 12, 1998 Automotive Analysis and Repair curriculum, students compared to13, 1999 Automotive Analysis and Repair curriculum, students. The students were compared using the same courses to determine if their performance improved from using Internet information.

RESEARCH VARIABLES

The researcher will use this experimental study to compare the population of 1998 to 1999 Danville Community College students to determine if the 1999 population will receive higher examination scores. The 1998 control group had access only to traditional library resources. The 1999 experimental group will have access to Internet information. The 1999 classes will use the Internet to do research and it was used to supplement and enhance classroom lectures.

INSTRUMENT DESIGN

The scores of students were compared between the 1998 and the 1999 groups. The scores are from the following test forms:

- AUT 241- Automotive Electricity I final exam
- AUT 242 - Automotive Electricity II final exam
- AUT 122 - Fuel Systems II final exam
- AUT 211 - Systems III final exam

METHODS OF DATA COLLECTION

The data for the 1998 class was retrieved from the grade files of students. This data was formatted into tables along with the data collected for the 1999 students. The grades will be listed by course with the exam grades from the 1998 control group along with the 1999 experimental group. These scores will be separated into the four automotive electricity and fuel control classes.

STATISTICAL ANALYSIS

This raw data in table format will permit data analysis. The data were analyzed as to the mean scores for each course for final exam grades. Based on the analysis a determination was made as to the difference in the performance of the 1998 control group to the 1999 experimental group using t-test procedures.

SUMMARY

The methods and procedures were presented in this chapter that were used to determine how Web-based instruction has affected the grades in Danville Community College Automotive Analysis and Repair Program. The grade score data were collected, compiled and analyzed according to courses. Chapter IV will present the findings of the study.

Chapter IV

FINDINGS

The problem of this study was to determine the effect of Web-based information on improving the knowledge of automotive students at Danville Community College. Data will be compared using assessment scores from 1998 students to 1999 students. The data will be used from electrical/electronic and computerized fuel control automotive classes. This chapter will include the findings of the study in four different sections according to the different classes. The format of the data will also be explained.

Findings

The data presented in this chapter were collected from the final exam grades in four automotive classes in the areas of electricity/electronics and computer controlled fuel systems. The data are listed into Tables 1 through 5. The 1998 students are listed by code from letters A through L and the 1999 students from AA through LL. One student was dropped from the data in 1999 due to scores way below the mean due to poor class attendance. The data was then compared using the mean measure of central tendency from 1998 to 1999 student scores. The researcher then applied the t-test procedure to the different groups to determine the difference between the two sample means for each of the courses.

Aut 241 Electricity I

The data, as shown in Table 1, compared between the 1998 and 1999 groups in Aut 241, Electricity I resulted in a 1998 mean score of 78.6 and a 1999 mean score of 78.2 for the student exam scores. The t-test result was .082 when comparing the two groups.

Aut 242 Electricity II

The data, as shown in Table 2, compared between the 1998 and 1999 groups in Aut 242, Electricity II resulted in a 1998 mean score of 76.8 and a 1999 mean score of 91.1 for the student exam scores. The t-test result was 3.60 when comparing the two groups.

Aut 122 Fuel Systems II

The data, as shown in Table 3, compared between the 1998 and 1999 groups in Aut 122, Fuel Systems II resulted in a 1998 mean score of 83.8 and a 1999 mean score of 82.2 for the student exam scores. The t-test result was .39 when comparing the two groups.

Aut 211 Systems III

The data, as shown in Table 4, compared between the 1998 and 1999 groups in Aut 211 Systems III resulted in a 1998 mean score of 74.9 and a 1999 mean score of 77.5 for the student exam scores. The t-test result was .46 when comparing the two groups.

Total Class Average

The data, as shown in Table 5, compared between the 1998 and 1999 groups in all classes combined average resulted in a 1998 mean score of 78.6 and a 1999 mean score of 84.7 for the student exam scores. The t-test result was 1.85 when comparing the two groups.

AUT 241 Electricity I

Table 1

1998		1999	
Student ID	Exam Score	Student ID	Exam Score
A	65	AA	62
B	71	BB	86
C	87	CC	73
D	91	DD	89
E	60	EE	95
F	88	FF	77
G	75	GG	81
H	80	II	70
I	88	JJ	97
J	74	KK	91
K	80	LL	65
L	84	MM	82
Mean Scores	78.6		80.7
T-test Result	.48		

AUT 242 Electricity II

Table 2

1998		1999	
Student ID	Exam Score	Student ID	Exam Score
A	57	AA	87
B	89	BB	98
C	79	CC	98
D	86	DD	95
E	50	EE	87
F	69	FF	83
G	85	GG	87
H	74	HH	99
I	90	II	98
J	86	JJ	88
K	81	KK	90
L	76	LL	96
Mean Scores	76.8		92.3
T-test Result	3.83		

AUT 122 Fuel Systems II

Table 3

1998		1999	
Student ID	Exam Score	Student ID	Exam Score
A	70	AA	67
B	90	BB	87
C	85	CC	97
D	87	DD	91
E	70	EE	91
F	79	FF	72
G	85	GG	79
H	78	HH	84
I	91	II	94
J	84	JJ	78
K	96	KK	92
L	90	LL	82
Mean Scores	83.8		84.5
T-test Result	.20		

Table 4

1998		1999	
Student ID	Exam Score	Student ID	Exam Score
A	52	AA	65
B	83	BB	83
C	80	CC	82
D	79	DD	82
E	65	EE	87
F	59	FF	52
G	75	GG	72
H	71	HH	85
I	95	II	91
J	75	JJ	69
K	80	KK	92
L	85	LL	100
Mean Scores	74.9		80
T-test Result	.98		

Total Class Average Scores

Table 5

1998		1999	
Student ID	Exam Score	Student ID	Exam Score
A	52	AA	70
B	83	BB	89
C	80	CC	88
D	79	DD	89
E	65	EE	90
F	59	FF	71
G	75	GG	80
H	71	HH	85
I	95	II	95
J	75	JJ	82
K	80	KK	85
L	85	LL	90
Mean Scores	78.6		84.7
T-test Result	1.85		

Summary

This chapter reported the findings of the study and presented the data. Tables 1 through 4 represented the scores of the 1998 control group and the relationship to the 1999 experimental group. The data were divided into four automotive courses: Aut 241, Aut 242, Aut 122, and Aut 211. Table 5 is an average of all class scores from the individual student averages for all the classes combined. The mean score for each class by group is given and the two groups compared using the t-test calculation. This data will be analyzed along with conclusions and recommendations in Chapter V.

Chapter V

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

In this Chapter V, Summary, Conclusions, and Recommendations, the researcher will summarize the findings of the study. This chapter will also allow the researcher to make conclusions from the data presented in this research report. A section will be included for both of these areas and the researcher will draw conclusions and make final recommendations for further research.

Summary

The problem of this study was to determine the effect of Web-based information on improving the knowledge of automotive students at Danville Community College. Data were compared using assessment scores from 1998 students to 1999 students. The data were used from electrical/electronic and computerized fuel control automotive systems classes.

The following hypothesis guided this study:

H_1: Danville Community College automotive students who used the Internet as part of instruction in 1999 will achieve better test and exam scores which will lead to higher final grades in electrical and computerized fuel control classes than students in the same classes in 1998 who were not taught Internet search skills.

Using the Internet in an automotive classroom can be a great addition. Over the years automotive students have struggled to gain information to keep them on the cutting edge of technology. The material available to them through public and campus libraries was very minimal.

This study was limited by the following topics:

1. The study will present data of 1998 to 1999 Danville Community College Automotive Analysis and Repair students.
2. The study will focus on automotive electrical/electronic and computerized fuel control systems training areas.
3. The amount of information available in 1999 on the Internet in these areas of electrical/electronic and computerized fuel control systems exceeds that available to previous classes of students as a learning tool.

To begin to conduct this experimental study, it was necessary to select a population from which to compare the data. The population of this study comprised 12, 1998 Automotive Analysis and Repair curriculum students compared to12, 1999 Automotive Analysis and Repair curriculum students. The students were compared between the same courses to determine if their performance improved from using Internet information.

The data for the 1998 class were retrieved from the grade files of students. These data were formatted into tables along with the data collected for the 1999 students. The tables compared the numbers between the two class years. The grades will be listed by course with the exam grades from the 1998 control group along with the 1999 experimental group. These scores will be separated into the four automotive electricity and fuel control classes.

These raw data in table format permitted data analysis. The data were analyzed as to the mean scores for each course for both exam and lab grades. Based on the analysis a determination was made as to the difference in the performance of the 1998 control group to the 1999 experimental group using t-test procedures.

Conclusions

The conclusions reached are based on the following hypothesis:

H_1 : Danville Community College automotive students who used the Internet as part of instruction in 1999 will achieve better test and exam scores which will lead to higher final grades in electrical and computerized fuel control classes than students in the same classes in 1998 who were not taught Internet search skills.

The test results gathered were shown by each of the four classes and the total class average for the critical values of t, and actual mean and t-test results.

The results for AUT 241 Electricity I:

- Critical values of t for a one-tailed test with 12 participants would be 1.782 at the .050 level of significance and 2.861 at the .010 level of significance.
- The actual values for AUT 241 was a mean score of 78.6 for the 1998 group and 80.7 for the 1999 group. The t-test result was .48. There was no significant difference between the two classes.

The results for AUT 242 Electricity II:

- Critical values of t for a one-tailed test with 12 participants would be 1.782 at the .050 level of significance and 2.861 at the .010 level of significance.
- The actual values for AUT 242 was a mean score of 76.8 for the 1998 group and 92.3 for the 1999 group. The t-test result was 3.83. There was a significant difference between the two groups. The Internet group scored significantly higher.

The results for AUT 122 Fuel Systems II:

- Critical values of t for a one-tailed test with 12 participants would be 1.782 at the .050 level of significance and 2.861 at the .010 level of significance.
- The actual values for AUT 122 was a mean score of 83.8 for the 1998 group and 84.5 for the 1999 group. The T-test result was .20. There was no significant difference between the two classes.

The results for AUT 211 Systems III:

- Critical values of t for a one-tailed test with 12 participants would be 1.782 at the .050 level of significance and 2.861 at the .010 level of significance.
- The actual values for AUT 211 was a mean score of 74.9 for the 1998 group and 80 for the 1999 group. The t-test result was .98. There was no significant difference between the two classes.

The results for the Total class Average Scores:

- Critical values of t for a one-tailed test with 12 participants would be 1.782 at the .050 level of significance and 2.861 at the .010 level of significance.
- The actual values for the Total Class Average was a mean score of 78.6 for the 1998 group and 84.7 for the 1999 group. The t-test result was 1.85. There was a significant difference between the two groups. The Internet supported group of students out performed the traditional taught students at the .05 level of significance.

The only individual class that supports the hypothesis at a significant level for the test data was for AUT 242. The t-test result of 3.83 supports the hypothesis above the .010 level for a one-tailed test. The Total Class Average also supported the hypothesis at the .050 level with a t-test score of 1.85. Therefore the data supports the hypothesis.

This study also has proven that students have enhanced their knowledge of computer operation and retrieval of information from the Internet as all of the 1999 students successfully completed several research projects relating to their course work. The 1998 students did not have these opportunities.

Recommendations

There can be many variables that go into the comparisons of two different groups of students regarding their exam grades as this researcher has discovered. Factors as to the demographics of each year's class make-up as to age, gender, and previous education are important. In a vocational area, the classroom verses the lab experience can be very different for different students.

This researcher feels a further study would need to take place to determine if overall course assessment of both classroom and lab performance would show any difference. From an instructor's assessment of actual work performance in the lab performing actual repair related tasks, the 1999 group was far superior. A further study may reveal if the Internet had any effect on this.

A study to compare classroom and lab grades of each student over a period of several years before and after integrating the Internet into the classroom should provide some very conclusive results.

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