

COMPARISON OF STUDENT CHARACTERISTICS, AND EVALUATION OF STUDENT
SUCCESS, IN AN ONLINE HEALTH EDUCATION COURSE

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An applied dissertation report presented to Programs for
Higher Education in partial fulfillment of the
requirements for the degree of
Doctor of Education

Nova Southeastern University

February, 2000

Acknowledgements

I would like to thank several people, without whose help this applied dissertation could hardly have come to fruition. To my dissertation committee, Drs. Stan Hannah, Larry Bustetter, and Richard Cardinali, thank you for your advice, patience, and determination to make this applied dissertation as good as it could be. Dr. Hannah's quip, "There are only two kinds of dissertations, those that are finished, and those that ain't," became my maxim and reminder to endure.

Many thanks to Ryan Cartnal for his advice on statistical questions and his persistence in "crunching" numbers. His efforts allowed my research to adhere to the almost inhuman deadlines that I set.

To my father—whose spirit and values guide me to this day—your faith helped me to "dream big dreams." To my mother; many thanks. Without your constant encouragement, love, and support, this would have never been possible—I share my degree with you. I love you both, and thank you from the bottom of my heart.

Finally, but not least, to my dear wife. You always believed in me and gave me constant positive support. Thanks for reading seemingly endless drafts, and for encouraging me and yet providing me with the solitude I needed to "crank it out." With all my love . . . the "Badger" prevailed.

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Institutions of higher education have consistently endeavored to deliver a quality education to an ever-burgeoning student population, and to reach previously unserved and underserved populations. Online courses have increased in popularity because they are convenient and because they successfully address work, scheduling, and other constraints that have precluded student enrollment in on-campus courses.

There were three problems that prompted the current study. First, since current adult learning theory promotes a learner-centered view of education, instructors need to properly assess student characteristics so they might adapt teaching methods to student learning preferences. Second, there existed no clear evidence that students who enrolled into online classes were as successful as students in equivalent on-campus classes. Third,

there was a need to profile online students to better advise faculty and prospective online students of the characteristics suggestive of success. The purpose of this study was to identify unique characteristics of online students, evaluate the success of online students compared to on-campus students, and to identify characteristics suggestive of student success. The goal was to minimize the likelihood of future academic non-success in online students.

The procedures for this study can be summarized in three parts. First, student characteristics data were collected and analyzed for online health education ($N = 96$), all-health ($N = 585$), and all-campus ($N = 9156$) students. Second, student success was determined by comparing the online group with an equivalent on-campus comparison ($N = 135$), using four criteria: exam scores, class grades, overall academic success, and satisfaction. Third, academically successful (grade of "C" or better), and academically non-successful (grade of "D," "F," or "W") students were profiled using selected demographics, questionnaire data, and learning styles.

Students enrolled in online health education classes were older, more academically experienced, and had a current course load not typical of a full-time (i.e., 12-15 units) student. Online classes had a higher percentage of the ethnic majority (White), and more female students, when compared to all-health and all-campus groups.

Students enrolled in the online classes were at least as, if not more, successful as equivalent on-campus students when success was measured by exam scores, obtaining a grade of "C" or better, and by student satisfaction. However, online students dropped out of online classes nearly twice as often as equivalent on-campus students; thus, online course enrollment represented a real risk for students who were not adequately prepared or whose profile did not match that of the successful online student.

Female students were more likely to succeed in the online class, and ethnic minorities, though under-represented, were more successful than the ethnic majority. Finally, successful online students exhibited an average prior college GPA of 3.02 (84% were above 2.36) and displayed strongly independent learning styles.

The author recommended that the college continue to support research to determine the overall effectiveness of online distance education. It was also recommended that the college develop a template that would allow faculty to easily assess student characteristics. Further, prospective online students should be informed of the unique profile of successful online students, and faculty should be apprised of students who enroll in online classes which do not fit the successful student profile. Finally, the college should disseminate the salient points of this research to the employees of the college through

appropriate channels: reports to committees, organizations, staff development days, and in the employee newsletter.

TABLE OF CONTENTS

	Page
LIST OF TABLES	11
LIST OF FIGURES	12
Chapter	
1. INTRODUCTION	13
Nature of the Problem	13
Research Problems	14
Background	14
Comparison of Student Characteristics	15
Evaluation of Student Success	16
Profiling Successful and Non-Successful Students	16
Purpose of the Project	17
Background and Significance of the Problem	17
Research Questions	18
Definition of Terms	19
2. REVIEW OF THE LITERATURE	24
Introduction	24
Challenging Traditional Educational Assumptions	27
Learner-Centered Education	27
Synchronous Versus Asynchronous Education	30
Traditional Versus Distance Education	31
The World Wide Web as a Distance Delivery Modality	34
Student Success in Online Courses	38

TABLE OF CONTENTS (cont.)

	Page
Learning Styles and Success in Distance Courses	42
Profiling Successful and Non-Successful Distance Students	51
Summary	53
3. METHODOLOGY AND PROCEDURES	57
Introduction	57
Formative Committee	58
Director of Research	59
Vice President of Student Services	59
Vice President of Instruction	59
Class Description	60
Data Collection and Analysis	61
Procedures	61
Assumptions	64
Limitations	65
4. RESULTS	66
Review of Literature	66
Student Characteristics	69
Demographics	69
Learning Styles	73
Student Success	77
Academic Success	77

TABLE OF CONTENTS (cont.)

	Page
Test Scores	78
Satisfaction	79
Student Success Profiles	81
Gender/Ethnicity	81
Income Level	82
Continuous Variables	83
Learning Styles	84
5. DISCUSSION, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS	88
Discussion	88
Comparing Selected Student Characteristics	88
Comparing Student Learning Styles	91
Evaluation of Student Success	95
Conclusions	98
Differing Student Characteristics	98
Evaluation of Student Success	99
Profile of Successful Student	99
Implications	99
Recommendations	101
BIBLIOGRAPHY	103
APPENDIXES	113
A. Student Survey Cover Letter	114
B. Online, All-Health and All-Campus Demographics	115

TABLE OF CONTENTS (cont.)

	Page
C. Distance Education Questionnaire	117
D. Grasha-Riechmann Student Learning Style Scales	119
E. Student Satisfaction Survey	121
F. Distance Education Questionnaire Results	122
G. Categorical Data	125
H. Continuous Data	127
I. Test Raw Scores	128
BIOGRAPHICAL SKETCH OF DAVID P. DIAZ	137

LIST OF TABLES

Table	Page
1. Student Ethnicity	70
2. Student Gender	70
3. Current Student Course Load	71
4. Student Level: Units or Degree(s) Completed	72
5. Student Age	73
6. Comparison of Learning Style Means by Category	74
7. Intercorrelations Between Learning Style Scales for Online and Equivalent On-Campus Students	76
8. Gender and Academic Success	81
9. Ethnicity and Academic Success	82
10. Income Level and Academic Success	83
11. Selected Continuous Variables and Academic Success	84
12. Learning Styles and Academic Success	85
13. Intercorrelations of Learning Styles Among Successful and Non-Successful Online Students	86

LIST OF FIGURES

Figure	Page
1. Grade distribution by group	77
2. Academic success rates by group	78
3. Test scores by group	79
4. Student satisfaction	80

Chapter 1

INTRODUCTION

Nature of the Problem

Cuesta Community College is a medium-sized (8,000–9,000 enrollment) two-year college on the Central Coast of California designed to offer a broad-based educational curriculum. Cuesta has, in its 30 years of existence, only recently offered its first distance education course.

At Cuesta, as elsewhere, there has been an historic need to provide access to previously unserved and underserved student populations, a problem that online distance learning programs may help to alleviate. According to the California State Governor's Office, in the next decade, California colleges and universities can expect a 40% increase in enrollment (Academic Plan, 1998). This is more than double the expected enrollment increases of any other state. As these new students flood the educational arena, student access may be hindered as educational facility construction lags behind student growth (Green, 1997c). Distance learning programs have already been proffered as one solution to the burgeoning student population.

International Data Corporation (IDC) has projected (1999) that "the number of college students enrolled in distance-learning courses will reach 2.2 million in 2002, up from 710,000 in 1998." This amounts to a growth rate of 33.0% annually. IDC also predicts that 85.0% of two-year, and 84.0% of four-year

colleges will offer distance learning courses in 2002; up from 58.0%, and 62.0%, respectively.

As more colleges begin to offer distance learning options, institutions will soon be competing for students in a way never imagined before. In order to attract and retain students, institutions will need to meet the students' expectations for accessibility and a high quality education that will provide the same level of academic excellence as courses taught in traditional modes. Instruction of any kind, using any delivery system, must establish and maintain high standards of performance (Academic Senate for California Community Colleges [ASCCC], 1997). In order to achieve the desired educational outcomes, distance education delivery systems must provide equivalent learning experiences for distant and local students (Simonson, 1997).

Research Problems

Background

The current focus in distance education research has been to answer questions regarding the relative effectiveness of different technologies in delivering content and in shaping instructional behaviors in distance classes (Moore & Thompson, 1997). High course attrition rates have also prompted several distance education studies (Dille & Mezack, 1991; Dowdall, 1991; Gee, 1990).

In attempting to determine the effect of educational treatments (i.e., distance versus traditional), many studies have overlooked more fundamental research questions: First, "Are there differences between traditional and distance students, and if so, what are these differences?" Second, "How successful are distance students when compared to their on-campus counterparts?" And third, "What are the characteristics suggestive of student success in an online mode?" Answering these types of research questions will likely influence educational practice at the institution by helping faculty to prepare for, and facilitate, distant education.

Comparison of Student Characteristics

In order to adequately prepare to teach distance education classes, there is a need to understand the specific characteristics of a given student population. Instructors generally transfer the same methods that have been successful for them in the traditional classroom into their online distance education courses. The underlying assumption is that students will exhibit the same characteristics in both distance and traditional settings. Another assumption is that educational teaching styles, and accompanying delivery methods, are like a "master key" and thus appropriate for any setting.

Because distance students may be different than equivalent on-campus students, some attempt must be made to determine if differences exist and to identify these unique student

characteristics. Further, since current adult learning theory promotes a learner-centered view of education, instructors will need to learn why and how to properly assess student characteristics so they might adapt teaching methods to student learning preferences.

Evaluation of Student Success

There is a need to assure administration, faculty, and students that distance education will provide a high quality education. There currently exists no clear evidence that Cuesta College students who self-select into online classes are as successful as students who enroll in equivalent on-campus classes. The current study will attempt to identify important indicators of student success. By examining student success, the current study will provide comparative data of success rates of online and traditional learners.

Profiling Successful and Non-Successful Students

There is a need to profile online students to better advise faculty and prospective online students of the characteristics suggestive of success in an online mode. Further, profiling successful students will ultimately help faculty, as well as counselors, identify those students who are likely to be academically non-successful (i.e., "high risk") in an online environment. Hopefully, this kind of profiling will allow better, and earlier, intervention and prevent future non-success of online distance education students.

Purpose of the Project

The overarching problem addressed in this study was to develop a profile of online health education students and of academically successful (AS) and non-successful (ANS) students. The current study, in examining a wide array of student characteristics, will function to narrow the scope of important characteristics so that, in the future, college faculty might obtain easier access to key student characteristics and use this information to tailor their teaching methods to their student population. The purpose of this study was to identify unique characteristics of online students, evaluate the success of online students compared to on-campus students, and to identify characteristics suggestive of student success. The goal was to help Cuesta College faculty, and other support personnel, to minimize the likelihood of future academic non-success in online students.

Background and Significance of the Problem

It is anticipated that Cuesta College will offer more distance education courses in the future (College Plan, 1998). The overall success of distance courses delivered online, will depend on how well they can meet the needs of the student, the faculty and the institution. The current study was completed under the auspices of the Cuesta College Department of Research and its results were reported to the administration, the college's Educational Council, and to campus personnel at-large.

Some assurance must be provided to the institution, the faculty, and the students, that distance education will meet their expectations for a high quality education. As increasing numbers of classes make use of online and other distance delivery methods, they will also encounter increasing scrutiny from sources outside the campus boundaries. The integrity of course outlines and articulation agreements must be maintained to ensure course transferability, and accreditation commissions will require standards of good practice in an attempt to ensure the quality of distance education (ASCCC, 1997, p. 6; McCollum, 1998).

The current study was undertaken to help ensure that future distance programs offered at the college will have sufficient guidelines to promote effectiveness and to ensure that distance education students ultimately achieve the same level of academic excellence as students taught in traditional modes.

Research Questions

There were three research questions considered in this study. First, "What are the principal differences in terms of demographics and learning styles between online health education students and their "all-health" and "all-campus" counterparts?" Second, "What are the principal differences between online and equivalent on-campus students (i.e., a non-randomly selected comparison group) in terms of overall academic success?" Third, "What are the unique characteristics, in terms of selected

demographics, questionnaire data, and learning styles, of academically successful online students?"

Definition of Terms

For the purpose of this applied dissertation, the following terms need clarification.

Academically successful (AS). Academic success is defined as receiving an "A," "B," "C," or "Credit" grade in the course.

Academically Non-successful (ANS). Academic non-success is defined as receiving "D," "F," "W," "Incomplete," or "No Credit" grades in the course.

Asynchronous communication. Asynchronous means "delayed-time" communication. Asynchronous communication takes place between two or more people at times (and/or locations) that are convenient for them.

Attrition rate. This is the number of drops between the first census and the end of the semester.

Categorical variable. A variable that separates subjects, objects, or entities into two or more categories (e.g., income level, educational level, nationality) is a categorical variable.

Chat. A system that allows two or more logged-in users to set up a typed, real-time, on-line conversation across the World Wide Web, is called a "chat room" or "web chat."

Continuous variable. A continuous variable is one in which the property or attribute of an object, subject, or entity is

measured numerically and can assume an infinite number of values within a range (e.g., age, hours worked per week, GPA).

Course grade. This refers to the letter grade earned in the course based on the number of percentage points earned: A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%; F = below 60%. "Official" course grades will be obtained by accessing the college mainframe computer system.

E-mail. Electronic mail is digital information delivered over a network.

Equivalent on-campus class. This is a class in which the content is presented by an instructor in the immediate and face-to-face presence of students, and which has the same course outline of record, course number, course title, and credit hours as the corresponding online class.

HTML (Hypertext Markup Language). HTML is a programming language that is used to publish documents on the World Wide Web that allows links to information in files on any computer connected to the Internet.

Hypertext/hyperlink. Hypertext involves a word or a phrase of text that becomes a link (hyperlink) to another word, phrase or other content. These links become contacts to other sources.

Hypermedia. Hypermedia is like hypertext except that the links take a person not only to other text elements but also to other forms of media including audio, video and graphics.

Grasha-Riechmann Student Learning Style Scales (GRSLSS).

The GRSLSS (Grasha, 1996) is a learning style inventory used to identify social (environmental) learning preferences. Social learning style preferences are those preferences that learners have for interacting with peers and the instructor in classroom settings. The social learning styles identified by this model are the Competitive, Collaborative, Avoidant, Participant, Dependent and Independent.

Internet. This is a network of computers that are electronically connected.

Learning styles. Personal dispositions that influence a student's ability to acquire and comprehend information, to interact with classmates and teacher, and to otherwise participate in the learning experience are called learning styles (Grasha, 1996).

List serve. This is a type of electronic mail in which a single message can be sent simultaneously to everyone on a mail list. Mailing list management software scans e-mail messages for the words "subscribe" and "unsubscribe" to automatically update the list.

Modem. An electronic device that converts serial data from a computer into an audio signal in order to transmit data over a telephone line is called a modem.

Multimedia. The integration of text, graphics, audio, video and animation—often delivered via microcomputer—is currently referred to as multimedia.

Network. A network is a set of nodes, points, or locations that are connected by means of data, voice, and video communications for the purpose of exchanging information.

Online. This term refers to the availability of an Internet connection for immediate use. Example: "I tried to get online with my Internet Service Provider, America Online, but I was unsuccessful."

Online class. This is a class in which the educational material is presented through the use of various communication technologies including class web site, e-mail, list serves, and computer multimedia, and which has the same course outline of record, course number, course title, and credit hours as the equivalent on-campus class.

Synchronous communication. Synchronous refers to "real time" communication. Examples would include the "chat rooms" of the large on-line services such as America Online or Prodigy.

URL (Uniform Resource Locator). A web page or web site address on the World Wide Web is called a URL.

Web site (or, site). A group of related web pages located on a web server is referred to as a web site. You usually enter and navigate the site via the home page.

World Wide Web (WWW or, Web). The WWW is a collection of a very large number of computers around the globe, all interconnected to be able to share resources.

Chapter 2

REVIEW OF THE LITERATURE

Introduction

Distance education has had a long and multifaceted history. The first wave of distance education began in the 19th Century, nearly 150 years ago (Klesius, Homan, & Thompson, 1997). Traditional distance education, featuring a print-based delivery method, has been variously referred to as "correspondence study," "home study," or "independent study" (Burgess, 1997). The correspondence mode of distance delivery has remained a standard until recently. Dramatic advances in communications technologies in the last 30 years have brought about changes in distance delivery norms. The 1997 Oryx Guide to Distance Learning (Burgess) provided information on 434 institutions, offering over 4,176 media-assisted courses for which academic credit can be earned (p. vii). The same Oryx Guide also listed no less than 21 different delivery systems by which these media-assisted courses were taught.

Of the different communications technologies available to deliver distance education, audio/video conferencing and telecourses have been the most popular through the early 1990s. The 1990s have also ushered in the use of the World Wide Web (WWW) as an educational delivery mode for distance education.

Green (1997a), in reporting the results of The Campus Computing Project, indicated that the use of e-mail, the Internet, and the WWW were becoming increasingly common within the instructional process. Green (1999) noted that in 1999 more than a fourth (28.1%) of all college courses were using WWW pages for class materials and resources, compared to 22.5% in 1998, 8.4% in 1996, and 4.0% in 1994. Further, nearly 31% of public two-year colleges had a formal plan for using the Internet and WWW resources in distance education (Green, 1998).

Among the characteristics attributed to online learning is its ability to provide "anytime" teaching and learning to its potential students. Institutions that can accommodate learners when they are ready to start a course, and provide them with flexible time-to-completion as well as time-to-degree options, are more likely to succeed as distance education enterprises (Saba, 1998b). Online distance education is ripe to fit these expectations as it offers access to course materials and an open classroom 24-hours per day.

In spite of the wealth of literature on the theoretical relationship between the WWW and instruction, there is still concern regarding student success in web-based courses. Numerous studies have attempted to determine the effects of distance modalities on student outcomes. Moore and Thompson (1990, 1997) reviewed many of these studies from the 1980s through the 1990s. They concluded that, though the

methodologies of many of the research designs were weak, distance education was considered effective, "when effectiveness [was] measured by the achievement of learning, by the attitudes of students and teachers, and by return on investment" (1997, p. 59).

There have also been critiques of distance studies. Moore and Thompson (1997) noted that many of the research studies that they reviewed demonstrated weak research designs, "specifically in regard to control of the populations being compared or otherwise studied, the treatments being given, and the statistical techniques being applied" (p. 59). Phipps and Merisotis (1999) suggested that design flaws in much of the distance education research have made the results so questionable as to render many of the findings inconclusive. Others, however, are not as convinced of the purported defects of distance studies and suggest that perhaps distance education research has unjustly faced a higher burden of proof than other scientific and educational research (Brown & Wack, 1999).

The following review will discuss distance education, specifically online learning, in light of changing educational assumptions and suggest how current educational assumptions have influenced the research, theory, and practice of distance education. Second, the review will report the theoretical basis for using the Web as an effective distance delivery modality. Third, studies that have attempted to assess student success in

an online mode will be reviewed. Fourth, since the current study will examine learning styles and their role in student success in an online environment, the author will review a number of studies that have examined learning styles and success in distance courses. Fifth, the review will examine studies that have profiled successful and non-successful distant students for the purpose of identifying characteristics suggestive of success, or for identifying "high risk" students.

Challenging Traditional Educational Assumptions

Learner-Centered Education

The traditional, teacher-centered ("instructivist") learning theory reinforces a view that knowledge is attained passively by information transfer from a knowledgeable "authority" figure (teacher) to the learner. Knowledge (reality) exists independent of, and external to, the learner. Since this concept of learning emphasizes the role of the teacher as a dispenser of knowledge, it leads quite naturally to a lecture format, a dualistic (i.e., "black and white") view of knowledge, and a passive learning perspective (Gardiner, 1998). Though it has been shown that actively involving students in discussion fosters retention of information, application of knowledge, and development of critical thinking skills, between 70% and 90% of professors still use the traditional lecture as their instructional strategy of choice (Gardiner, 1998).

Perhaps many educators are still having difficulty shedding the protective cloak of their traditional instructivist training. In many cases, teachers teach as they have been taught (Gardiner, 1998). Since an instructivist learning theory has prevailed for quite some time, it is understandable why so many instructors have used a teacher-centered approach in the classroom and why much of current research tacitly approves an instructivist world-view. This may also explain the tendency of traditional students to exhibit dependent (passive) learning styles (Grasha, 1996).

At the present time, the adult learning theory paradigm has shifted from a teaching towards a learning paradigm (Berge & Collins, 1995; Schuyler, 1997). The "constructivist" learning perspective asserts that the learner constructs new knowledge through a process of relating new information to prior knowledge and experience (Olgren, 1998). Teachers become guides rather than dispensers of knowledge, and students are more active in the learning experience. Students need not be filled up as if they were passive, empty vessels. Rather than being the passive recipients of knowledge, students are capable of constructing their own knowledge with guidance from their teacher (Berge & Collins, 1995) and can become lifelong learners by being enabled to locate the resources necessary to continue learning. Instructors need not map their own interpretations of the world onto the learner because teacher and learner do not share a

common set of experiences and interpretations (Jonassen & Reeves, 1996). Since the mind actively filters input from the world in making interpretations, the learner will conceive the world differently from the teacher. In the final analysis, the learner should be able to evaluate a variety of interpretations, and use them in achieving their own unique interpretations of the world.

The extent to which teachers see themselves as "instructivist" versus "constructivist," determines the extent to which classroom activities would be based on teacher or student preferences. Further, the selection of instructional technologies in a distance environment would be, in part, determined by a teacher's preferred learning theory.

With more interest and acceptance of current adult learning theory, there have been more attempts to examine the role of student learning preferences as they relate to student success. The vast resources of the WWW should enable students to acquire the information necessary to construct their own knowledge. To take advantage of the opportunities of distance learning, teachers will require a clear understanding of the strengths and weaknesses of the various technologies used within the online setting. They will also need to understand how to create learning activities that will take advantage of the strengths of educational technologies to meet student learning preferences.

Synchronous Versus Asynchronous Education

One of the bedrock assumptions in the history of higher education has been the assumption that education must take place in a physical classroom in which instructor and students are "face-to-face," and interacting in "real time." This real time, facility-dependent, "synchronous" mode of education has been the driving force for educational planning, course accounting, faculty work-load, tuition, and state funding schemes (Matthews, 1998).

Traditional correspondence-based distance education has been criticized for its absence of interaction between and among teachers and students. However, since current communications technologies allow students to share virtual (as well as physical) space, many of the activities that have been relegated to the traditional classroom can now occur over communications networks (Matthews, 1998).

There are several technologies within the realm of the WWW that can facilitate self-directed, active, and collaborative learning as well as meet the challenges of educational delivery to the online learner. Several forms of synchronous (real time) and asynchronous (delayed time) technology can provide interaction between teacher and learner that is stimulating and that meets the needs of the learner. Information can be delivered in a variety of forms. Real-time "chat," "threaded" discussion, hypermedia such as audio, video and graphics,

Shockwave, Virtual Reality Modeling Language (VRML), and Java applets, are just some of the new and/or emerging technologies that promise to make the WWW compelling and interactive while delivering rich content. Together, these technologies represent an innovative and potent force for educational delivery over the Web (Kaplan, 1997).

Traditional Versus Distance Education

A large portion of distance education research has been devoted to comparative studies of distance and traditional methods of education. In this type of research, the teaching modality (traditional or distance) is considered the independent variable and the research intends to find out how distance education compares with traditional teaching with respect to promoting student success (e.g., course grades, test scores, attrition).

Much of comparative research has an implicit, yet not often-mentioned, assumption: namely that "traditional" education is the ideal mode of educational delivery and thus can serve as the "gold standard" against which all other forms of "alternative" education are measured. This assumption, though often given tacit approval, is untenable because there is no way to determine that one class method is better than another without first establishing criteria for such a determination. Brown and Wack (1999) suggested that it is difficult to acquire clear, compelling evidence of the impact of technology on

student learning outcomes. They noted that studies attempting to provide this evidence are usually based on the assumption that "such 'compelling' evidence is attainable, and second, that even amid 'dizzying' technological change and shifting student populations such comparisons with conventional education are relevant."

Another problem with comparative research is that it rarely defines what it means by "distance" (or even "traditional") education. Saba (1998a) has pointed out that, "[Comparative studies] fail to adequately define 'traditional' education or present a sufficient differentiation between traditional education and [computer] mediated education." Ehrmann (1995) added that it is necessary to explicitly state the differences between distance and traditional modes of instruction (e.g., with respect to modes, methods, materials, and motives). Otherwise the results of comparisons between the two modes of teaching/learning cannot be justified.

However, even when studies successfully explicate educational processes, there are still inherent problems. Ehrmann (1995) pointed out that by specifically detailing what "traditional" or "distance" means (i.e., what materials, motives, or methods are employed), "you limit your study to a very small and temporary universe." In other words, by framing educational modalities within their unique contexts, one limits the generalizability normally expected of experimental research.

Some researchers have argued that research designs other than true experimental approaches (i.e., evaluative studies, or those without random samples) are weak, and inconclusive with respect to the efficacy of distance modalities. Phipps and Merisotis (1999), in a sweeping critique of distance education studies, noted that "most of the studies do not use randomly selected subjects." They concluded that these studies run the risk of allowing multiple variables to confound study results and affect the outcome. The problem with this type of critique is that it is not practical. The reality of enrollment patterns is that students self-select into courses based on reasons important to them, such as preferences for certain times, teachers, or locations, or to accommodate personal schedules. Randomizing subjects in a distance study may increase generalizability in theory, but in practice many of the findings are not likely to be useful, unless one assumes that students who are randomly assigned are representative of those who enroll into a course.

Saba (1998a) and Ehrmann (1995) have suggested that many studies are simply asking the wrong research questions. Saba recommended that research hypotheses focus on whether or not educational strategies are successfully engaging students, and if there is ample communication and interaction between instructor and student to promote the construction of knowledge. In other words, the focus should not be on the instructional

modalities but rather on factors affecting student success and learning.

One cannot help but think that the current confusion about the role of technology in the teaching/learning process is rooted in the dichotomy between teacher versus learner-centered theories of learning. The traditional, teacher-centered, "instructivist," learning theory reinforces a view that knowledge is attained passively by information transfer from a knowledgeable "authority" figure (teacher) to the learner. In the instructivist view of learning, it is the teacher who controls the learning process through the "distribution" of knowledge. This approach clearly places the emphasis for learning on the method of dispensing information rather than the facilitation of learning through the matching of learning activities to student learning preferences.

According to the constructivist approach, teachers become guides rather than dispensers of knowledge, and instructional practice places more importance on the role of the student in constructing knowledge. Thus, geographical distance becomes irrelevant, and technology is only important to the extent that it is able (or unable) to facilitate communication and construction of knowledge (Saba, 1998a).

The World Wide Web as a Distance Delivery Modality

In California, online courses are exploding in popularity as they hold the promise of allowing students to attend classes

on their own terms (Wolverton, 1999). One reason for the popularity of online courses seems to be convenience (Guernsey, 1998)—with a 24-hour classroom, students can access course materials when, where, and how often they choose. Another reason students prefer online courses is because such offerings successfully address work, scheduling, and other constraints that have often precluded enrollment in on-campus courses (Richards & Ridley, 1997). There is also evidence that offering online courses may increase net enrollments as opposed to merely redistributing students that would otherwise enroll in on-campus courses (Ridley, Bailey, Davies, Hash, & Varner, 1997).

There is a new paradigm for teaching and learning that utilizes interactive multimedia technologies and the WWW (Kaplan, 1997). Some have demonstrated the rationale for (Kilian, 1997), and others have given examples of (Collins, 1997; Vishwanatham, Wilkins & Jevic, 1997), the use of the WWW as an effective medium for instruction. Whether one uses the WWW as a supplement to an existing course, or as a delivery system for a stand-alone course, instructional design tips abound (Brown, 1997; Boshier, et al., 1997; Rosen, 1998).

Current understandings of how the WWW can positively influence teaching and learning have been shaped by advice on the do's and don'ts of web teaching (Boettcher, 1997), by descriptions of new instructional techniques (Naidu, 1997) and new media (Diaz, 1999a; Kaplan, 1997), and by case studies of

web teaching in action (Bazillion & Braun, 1998; Collins, 1997; Lacina-Gifford & Kher-Durlabhji, 1996).

Using the web to support instruction has its strengths and weaknesses. Kerka (1996) listed the advantages and disadvantages of using the WWW as an instructional mode:

Advantages

1. Flexibility of class time and space
2. Expanded potential audience
3. Cross-platform compatibility
4. Quick development times
5. Easy updating of educational content
6. Lower development costs compared to other hi-tech delivery options

Disadvantages

1. Limited bandwidth and slow modems
2. Over reliance on learner initiative
3. Learner success depends on technical skills in computer operation, web navigation, and ability to cope with technical problems
4. Information overload requires information management skills
5. Access to Internet-based courses may still be a problem for geographically isolated and some disabilities
6. Social isolation

Several studies have noted the concerns and frustrations of both teachers and students with the online learning experience. Hara and Kling (1999) surveyed students taking an online course and found that the main sources of student frustration were technical problems, minimal and non-timely feedback from instructors, and ambiguous instructions on the WWW site as well as via e-mail. Berge (1998) surveyed post-secondary teachers who had taught online courses. The most frequently mentioned concerns by the 42 respondents to this survey were the concerns for developing high-quality courses, followed by concerns for the effectiveness of their teaching. Wilson (1998) surveyed instructors of web courses listed in the Southern Regional Electronic Campus registry for the Spring 1998 semester. The 31 respondents chose "sufficient time to develop and maintain course material," "technical support," and "administrative support," as their top three concerns in order. Wilson concluded that institutions need to develop a training and support infrastructure for faculty to develop web-based courses, a revised incentive/reward system, and reliable computer hardware.

Taking advantage of the opportunities afforded by the WWW, while avoiding the pitfalls requires ample preparation by faculty, students, and administration (Findley & Findley, 1997; Green, 1997b; Kerka, 1996). To facilitate sound instructional practice, teachers need to understand the strengths and

weaknesses of various technologies used within the online environment and become aware of the typical concerns related to online education (Berge, 1998). The mere availability of technology does not ensure good instructional practices, nor does the mere use of technology ensure student success. The strengths of online learning will only be realized in the appropriate selection, proper use, and precise mix of distance technologies (Chen, 1997).

Student Success in Online Courses

In spite of the wealth of literature on the theoretical relationship between the WWW and good teaching/learning practices, there is still concern regarding student success in web-based courses and an overall lack of studies. Most models of how to examine student success in a distance setting have come from studies examining audio/video conferencing and telecourses. Moore and Thompson (1990, 1997) reviewed many of these studies from the 1980s through the 1990s and concluded that distance education was considered effective, "when effectiveness [was] measured by the achievement of learning, by the attitudes of students and teachers, and by return on investment" (1997, p. 59).

Student performance, attrition (drop rate), persistence, and retention (the tendency of students to enroll in a subsequent course), are important student success factors that have been studied in online courses. Schutte (1998) examined

the effects of "virtual teaching" on academic performance in an online Social Statistics course. Thirty-three students were divided into two groups using a systematic random sampling of the enrollment list. The traditional group was comprised of 17 students, while the virtual (online) group contained 16. Pre-test questionnaires determined student demographics and student experience with computers, math, and statistics. Post-test assessment consisted of student scores on mid-term and final as well as information on a post-test questionnaire. Schutte found no significant differences between the groups in age, sex, ethnicity, year in school, mean GPA, mean units attempted in semester, or hours worked per week. The study apparently employed a Likert-type survey to determine initial student feelings regarding math, computers and statistics; there were no statistical differences between groups. Mid-term and final exam scores were significantly higher for the virtual class ($p < .001$) when compared to the traditional class. Schutte attributed performance differences to student collaboration, which was enhanced in the distance mode, not to the technology itself. Schutte suggested that the virtual students, because of their inability to ask questions of the professor, as in a face-to-face environment, compensated by collaborating with their classmates. Schutte recommended controlling for student collaboration in future studies.

Ridley and Sammour (1996) explored instructional design issues to improve institutional effectiveness and student access. They examined student performance and satisfaction in courses delivered online. Their findings indicated that, "the online students' performance was quite comparable to, and in some cases excelled, that of their classroom counterparts." They noted a high rate of withdrawal over two semesters—of 30.0% and 25.0%, respectively. However, the students who persisted in the courses were satisfied with their educational experience and were more likely to enroll in subsequent online courses. Students with prior online experience averaged more online course enrollments per person in a subsequent semester (from 1.26 to 1.47), an increase of nearly 20%. This finding suggested that online courses were accepted by students as a viable alternative mode of educational delivery.

Richards and Ridley (1997) studied factors affecting students' selection of, and persistence in, online courses. Based on the selection criteria of prior and current online course enrollment, a sample of 126 students was initially surveyed by telephone. The final sample size, based on the number of usable surveys was 69 (54.8% return rate). The survey included background questions designed to validate the students' inclusion in the study (number, type, and most recently-completed online course); elicit demographic information (age, gender, major, class level); and determine the one-way driving

distance of online students. Persisting online students were asked why they chose online courses instead of traditional courses, where they acquired their computer skills, and how "comfortable" they felt in a computer environment. Participants were asked to rate the influence of their self-perceived computer skills on their decision to enroll in an online class. Student satisfaction was also considered as a factor in persistence: students were asked to rate the overall quality of their most recent online course. Finally, the students were asked to rate the difficulty of using a new computer interface for the online courses. The authors concluded that student satisfaction with online courses was a major factor in student persistence. A majority of students rated their distance instruction as "Good" (33.0%) to "Excellent" (46.0%). The authors posited two primary factors for student satisfaction and enrollment growth. First, online distance courses continued to meet student needs for overcoming time and schedule conflicts to enrollment and degree progress. Nearly 87% of the students surveyed indicated that their reason for enrollment in the online course was because they were "precluded from taking the classroom equivalent by work and class schedule conflicts and other constraints." The authors noted that driving distance was not a factor in online course selection since mean driving distance was within the typical driving range. Second, students expressed an increased comfort in working with an updated

graphical user interface for the distance course. The new interface was widely accepted and enhanced student satisfaction.

Diaz (1999b) evaluated the success of online health education students (N = 69) and equivalent on-campus students (N = 139) in four areas: test scores, academic success (grade of "C" or better), attrition, and student satisfaction. Online students outperformed on-campus students on each of four semester tests and in overall academic success rates (75.3%, 74.1%), however the attrition rate for online students was twice that of equivalent students (14.5%, 7.2%). Satisfaction ratings of online students were higher than on-campus student ratings on each of 11 survey questions. Diaz concluded that online students were at least as successful, if not more successful, than their equivalent on-campus counterparts when success was measured by performance on semester tests, by percentage of students attaining a "C" or better grade, and by student satisfaction with their overall experience of the class. Diaz recommended that future studies be carried out to determine why online students drop out more frequently than on-campus students.

Learning Styles and Success in Distance Courses

For many years, educators have noticed that some students prefer certain methods of learning over others. These traits, referred to as learning styles, form a student's unique learning preference and aid teachers in the planning of small-group and

individualized instruction. If optimal student learning is dependent on learning styles, and these styles vary between distance and equivalent on-campus students, then faculty should be aware of these differences and alter their preparation and instructional methods accordingly. James and Gardner (1995) warned against replicating the problems and failures of the conventional classroom and urged faculty to consider learning styles in the context of distance learning. They noted that distance education courses would most likely be enhanced by understanding the learning preferences of the students enrolled.

The Grasha-Riechmann Student Learning Style Scales (GRSLSS), an instrument developed in the early 1970s, has been used to identify the preferences learners have for interacting with peers and the instructor in the classroom setting (Grasha, 1996). The six social learning styles identified by this model are the Independent, Dependent, Competitive, Collaborative, Avoidant, and Participant. The Independent learner prefers independent study, self-paced instruction and would prefer to work alone on course projects than with other students. Dependent learners look to the teacher and to peers as a source of structure and guidance and prefer an authority figure to tell them what to do. Competitive learners learn in order to perform better than their peers and to receive recognition for their academic accomplishments. Collaborative learners learn by sharing and by cooperation with teacher and peers. They prefer

lectures with small group discussions and group projects. Avoidant learners are not enthused about attending class or learning class content. They are typically uninterested and are often overwhelmed by class activities. The Participants enjoy class and make good class citizens. They are interested in class activities and discussion and eager to do class work.

The styles described by the GRSLSS refer to a blend of characteristics that apply to all students (Grasha, 1996, p. 127). Each person possesses a bit of each of the learning styles. Ideally, one would have a balance of all the learning styles; however, most people gravitate toward one or two of the learning style preferences. Learning preferences are likely to change as one encounters new life and educational experiences. In fact, Grasha (1996) has suggested that particular teaching styles might encourage students to adopt certain learning styles (p. 177).

Of the different learning style instruments available the GRSLSS seems ideal for assessing student learning preferences in a college-level distance education setting. First, the GRSLSS is one of the few instruments designed specifically to be used with senior high school and college/university students (Hruska-Riechmann & Grasha, 1982). Second, the GRSLSS is a relevant scale to use for distance research since it addresses the social dynamic that serves as the main difference between the distance and traditional groups. The scales focus on how students

interact with the instructor, other students, and with learning in general; thus, the scales address one of the key distinguishing features of a distance class: the relative absence of social interaction between instructor/student and student/student. Third, the GRSLSS promotes an optimal teaching/learning environment by helping faculty design courses and develop sensitivity to student/learner needs. Fourth, the GRSLSS promotes understanding of learning styles in a broad context by spanning six categories. Since students possess all of six learning styles to a greater or lesser extent, this system of classification prevents learning style stereotyping and provides incentive for growth in underused learning style areas.

Diaz and Cartnal (1999) used the GRSLSS to compare the student learning styles of an online health education class with those of an equivalent on-campus class. The purpose of this study was to compare the student learning styles of two online health education classes ($N = 68$) with an equivalent on-campus class ($N = 40$). The GRSLSS was administered to determine student social learning preferences in six learning style categories. Students who enrolled in the distance education class were significantly more Independent learners than students in the equivalent on-campus class ($p < .01$). Students enrolled in the equivalent class were significantly more Dependent learners than the online distance students ($p < .01$).

Correlational analysis revealed that on-campus students displayed collaborative tendencies that were positively related to their needs to be competitive and to be good class citizens. Thus, on-campus students appeared to favor collaborative styles to the extent that it helped them to obtain the rewards of the class. In contrast, online students were willing and able to embrace collaborative teaching styles if the instructor made it clear that this was expected and gave them form and guidance for meeting this expectation. Online students appeared to be driven more by intrinsic motives and clearly not by the reward structure of the class.

The authors suggested that faculty who plan to put a traditional course online, should consider administering a student learning style inventory to both their distant and traditional students. Knowledge of student learning preferences can aid faculty in preparing for class, designing class delivery methods, choosing appropriate technologies, and developing sensitivity to differing student learning preferences within the distance education environment.

One of the most popular learning style inventories and one that is often used in distance learning research is the Kolb Learning Style Inventory (LSI) (Kolb, 1986). Kolb's LSI measures student learning style preference in two bipolar dimensions. Over time, learners develop a preference for either a concrete or abstract approach to learning, as well as a

preference for active experimentation or reflective observation (Dille & Mezack, 1991, p. 27). James and Gardner (1995) described Kolb's LSI as a cognitive learning style mode. Cognitive processes include storage and retrieval of information in the brain and represent the learner's ways of perceiving, thinking, problem-solving and remembering (p. 20).

High drop rates prompted Dowdall (1991) to use the Kolb LSI to assess the learning styles of 52 students enrolled in a California community college Psychology 1A telecourse. He hypothesized that learning style might be a contributor to selection and retention in the telecourse. Divergers and Assimilators composed the majority of learning styles in both the distance and control groups. Divergers are those who process information through concrete experience and transform it through reflective observation. Assimilators grasp information through abstract conceptualization and then transform it through reflective observation. There were more Assimilators in the distance group and more Divergers in the control group. Dowdall reported that student drop rates at mid-term were independent of learning style. However, he noted that the majority of students still enrolled at mid-term either shared his learning style or shared at least one of the learning modes that made up the Assimilator learning style. He suggested that students with learning styles compatible with the instructor's learning style develop a bond that keeps them in class. An analysis of grades

revealed that grades in the television-based courses were comparable to on-campus courses. According to Dowdall, the relative isolation of this form of distance learning is offset by the convenience of allowing students the opportunity to fit course activities into their work and family schedules.

Dille and Mezack (1991) used the LSI to identify predictors of high risk among community college telecourse students. Successful students ($n = 108$) had significantly lower ($p = .0276$) Concrete Experience (CE) scores than did the non-successful students ($n = 43$). The LSI y-axis average score (Abstract Conceptualization minus Concrete Experience) (AC-CE) was significantly higher ($p = .0432$) for the successful telecourse students. A positive score on the AC-CE scale indicates a learning style that is more abstract while a negative score indicates a concrete learning style. Since distance learning courses tend to lead to social isolation and require greater reliance on independent learning skills, students with lower CE scores were expected to be more suited to the distance format. High scorers in CE relate better to people and exhibit a greater sensitivity to feelings and thus would be expected to require more student/student and/or student/teacher interaction. The more abstract learning styles favored success in the telecourse. Dille and Mezack concluded that a higher than average CE score, or a lower than average AC-CE score were both predictors of high-risk in telecourse students. They

recommended that prospective online students be administered Kolb's LSI, and that high-risk students be encouraged to enroll into equivalent on-campus classes.

Gee (1990) studied the impact of learning style variables in a live teleconference distance education class. The purpose of the study was to examine the influence of student learning style preference in an on-campus or distance education remote classroom on student achievement in the following areas: course content, course completion rates, and attitudes about learning. Both distance and on-campus groups were taught simultaneously by the same instructor, received identical course content, and both groups met weekly. Twenty-six students self-selected into a graduate-level learning resources education course in either an on-campus ($\underline{n} = 9$) or distance ($\underline{n} = 17$) mode. Gee administered the Canfield Learning Styles Inventory (CLSI). The CLSI groups students into one of nine learning style typologies (Canfield, 1980). The distance class subjects identified in the Independent/Conceptual learning style group had the highest mean scores in all of the areas, and subjects in the Social/Conceptual learning style group had the lowest mean scores in all of the areas. In the on-campus class, the subjects identified in the Social/Applied learning style group had the highest mean scores in three of the five areas, while subjects identified in the Conceptual learning style group had lower mean scores in all areas. The study showed, albeit

inconclusively (small sample sizes), that successful distance education students favored an independent learning environment while successful on-campus students showed a preference for working with others. The CLSI demonstrated merit for use in distance learning studies since it attempted to measure student preferences in environmental conditions such as the student's need for affiliation with other students and the instructor, and the student's need for independence or structure. These differing social dynamics represent a main difference between distance and traditional environments.

Gordon (1996) profiled the preferred productivity and learning style preferences of students enrolled in distance education courses at Marshall University. A stratified random sample ($N = 117$) of students was drawn, and then administered the Productivity Environmental Preference Survey (PEPS) (Price, Dunn, & Dunn, 1991). Students from three different programs (nursing, education, and paralegal) were administered the 100-item, Likert-format PEPS survey which yielded scores in 20 areas. Significant differences were found for seven of the 20 areas. Findings suggested that environmental, sociological and perceptual preferences were essential for enhancing productivity. The author recommended that distance education instructors design interactive activities according to the various learning styles involved and make alternative activities available for students who may not want to take part in group

activities. Gordon also recommended that prospective distance education instructors complete an inservice education program that covers prescribed elements of productivity and learning styles.

Profiling Successful and Non-Successful Distance Students

A unique approach to studying student success in the distance environment can be found in studies attempting to profile student success and non-success characteristics. There are three potential benefits from such studies. First, students can be more effectively recruited by matching their characteristics to class modality. Second, student success might be enhanced by prior identification of "high risk" students or by identifying characteristics suggestive of success. Third, profile studies can support faculty efforts to more specifically meet the needs of students (Biner & Dean, 1997).

Dille and Mezack (1991) attempted to identify predictors of high risk among community college telecourse students. They related personality factors, learning styles, and selected demographics to academic success (grade of "C" or better) and non-success (grade of "D", "F", or "W").

Successful students ($n = 108$) were likely to be over 25 years of age, married, have higher than a 2.9-3.0 grade-point average, and have completed more than 30 previous college credit hours.

Biner and Dean (1997) identified predictors of student achievement (final course grades) in live interactive telecourses. They wanted to identify personality correlates of student achievement, and chose the Sixteen Personality Factors Questionnaire (16PF) as the assessment instrument. The authors used Form C of the 16PF since it required less time to administer (approximately 20 minutes) and was easier to hand-score. The 105-item form produced scores on 16 distinct personality characteristics (factors). Three personality factors were predictive of final course grades. Higher performers tended to be more self-sufficient and exercised a high degree of expedience in their daily lives. High performers were also the least compulsive. The authors also used demographic and experiential variables as predictors of achievement.

Students' perceptions of the promptness of class materials exchange and their year in school were related to higher grades. Those most satisfied with the speed of information exchange between instructor and students (e.g., returning assignment scores), and those farther along in school (i.e., juniors and seniors), performed better in the course.

Diaz (1999c) developed a profile of online health education students and of academically successful and non-successful students. The purpose of the study was to identify differences

between online and on-campus students, and to develop a list of characteristics suggestive of online success.

Student demographics were collected for online health education classes ($N = 69$), and compared to all-health ($N = 585$), and all-campus ($N = 9156$) students. Successful (grade of "C" or better) and non-successful (grade of "D," "F," or "W") students were compared by selected demographics, questionnaire data, and learning styles. Online students were older, as evidenced by a higher percentage of students between 22-50 years (53%) and more academically experienced, as evidenced by percentage having earned degrees (23%), than all-health (25%, 2.2%) or all-campus (42%, 11%) students, respectively. Successful online students were more likely to exhibit a prior college GPA of 2.35 or higher, be older than 18, have a Participant learning style score of 3.37 or higher, and an Avoidant learning style score of 2.26 or lower. Though ethnic minorities were underrepresented in the online sample, they were at least as successful as the ethnic majority.

Summary

Distance education, which has enjoyed a long and prosperous existence, has been dominated until recently by the correspondence mode of delivery. One of the more recent advances in the delivery of distance education is the advent of the WWW and online learning. Online courses are exploding in popularity due to their convenience and because they

successfully address work, scheduling, and other constraints that typically preclude enrollment in on-campus courses.

A large body of research has deemed distance education comparable to traditional teaching approaches. However, some have countered that poor research design has rendered the results of these studies inconclusive at best. Traditional education has been dominated by the assumption that the learning process is teacher-centered ("instructivist") and must take place in a synchronous, face-to-face environment. The learner becomes a passive participant in a process in which the teacher "distributes" knowledge to the learner. However, current adult learning theory has shifted from a teaching environment to a learning environment. This "constructivist" learning perspective asserts that the learner constructs new knowledge through a process of relating new information to prior knowledge and experience. Since learners play an important role in constructing new knowledge, teachers need to assess the learning preferences of students and create learning activities that address student needs.

In order to take advantage of the opportunities of distance learning, teachers will require a clear understanding of the strengths and weaknesses of the various technologies used within the distance setting. They will need to understand how to facilitate an optimal learning environment using communication

technologies and how to take advantage of the strengths of these technologies to meet student learning preferences.

The design of much of the current distance education research is implicitly based on instructivist learning principles that naturally place an emphasis on the modes of delivery of instruction. Thus, current research may have mistakenly placed an emphasis on the importance of instructional modalities in affecting student learning rather than on the importance of student characteristics to success.

Research questions that compare traditional to distance modes of instruction are burdened by unwarranted, or at least, unacknowledged assumptions:

1. Traditional education can be intuitively defined.
2. Traditional instruction should serve as the "gold standard" by which all other forms of instruction should be compared.
3. True experimental research design (including random assignment of subjects) is the only appropriate (or even the most appropriate) design for use in distance education research.

Current literature has also focused on student success in terms of class performance (e.g., test scores), attrition, retention, and satisfaction. At this time, the literature has confirmed that online students are more apt to drop out of an online class, but students who persist are satisfied with the online experience and are more likely to enroll in future online

courses. Further, online students perform as well or better than their on-campus counterparts when performance is measured by test scores and overall grades in the course.

With more interest and acceptance of current adult learning theory, which emphasizes student-centered learning principles, there have been more attempts to examine the role of student learning preferences as they relate to student success. The impact of learning styles on success in a distance environment has been studied with mixed results. Most studies seem to agree that learning styles can have an effect on student outcomes. They also agree that student learning styles should be considered in course preparation, design, and class delivery methods, and for the purpose of developing sensitivity to student learning preferences in the distance education environment.

Of particular interest are the studies that have attempted to profile successful and non-successful distance students. These studies supply information that can potentially benefit efforts at student recruitment, can identify "high risk" students, and can support faculty instructional efforts. Profiling studies have examined personality factors, learning styles, demographics, and other variables that are polled through survey instruments.

Chapter 3

METHODOLOGY AND PROCEDURES

Introduction

The current study used the evaluative research methodology. With the current explosion in online course offerings, there needs to be some assurance that online courses offer at least the same level of academic quality and student success rates when compared to equivalent on-campus courses. Since there was no clear evidence that online students were as successful as equivalent on-campus students, the current study evaluated student success in an online environment and compared that to success rates for students in an equivalent on-campus class.

This study also employed a quasi-experimental (post hoc) research design—with non-random sampling, and descriptive statistics—to compare differences between online students and three traditional student groups: a non-random comparison group (equivalent on-campus students), all-health, and all-campus groups. Comparisons between groups were made using results from demographic data, questionnaire, learning style inventory, and instructor grade sheets.

To ensure ample data for comparisons between groups, data was collected retrospectively over three semesters. Since only one section of the online health education class was offered each semester, the author combined results from the Fall and Spring 98, and Spring 99 semesters. Data for the equivalent on-

campus comparison group were collected during the Fall 98 semester.

The author used descriptive statistics (N, SD, M raw scores, and/or M %) to compare successful and non-successful online students. Correlational analysis was used to compare within-group learning style scores, and t tests were used to determine the magnitude of differences between mean learning styles scores.

Inferential statistical analyses were not employed in the current study. Though inferential statistics are used often in educational research, even when the samples are of a non-probability type, the author did not see any advantage in this case. Current research indicates that distance education students are a heterogeneous population. Since the dynamic nature of the distance population precludes a "typical" student profile (Thompson, 1998, p. 9), instructors should continually assess student learner characteristics. Rather than attempt to generalize the findings to other disciplines and courses, the author hoped to generalize only to online health education students and to provide a research model that might be used by other schools, instructors, and disciplines to achieve similar goals.

Formative Committee

A formative committee determined the criteria for success used to evaluate online and on-campus students in this study. The following people were in the formative committee.

Director of Research

At Cuesta College, the Director of Research oversees all institutional research projects. Since the current study was conducted under the auspices of the Cuesta Research Department, the director was included for his expertise in conducting institutional research, as well as for his position as overseer of all institutional research projects.

Vice President of Student Services

The VP of student services was selected because of his role in representing student interests. He provided valuable input on how "student success" would be defined from a student perspective, especially as regards student support.

Vice President of Instruction

The VP of instruction served as the voice of the administration. Her role was to represent the college-wide interests in the distance research, as well as to articulate the administrative perspective as regards student success.

A summative committee was not used in this study. Criteria for success are often unique to the given institution; that is, the relevance and importance of each criterion is based on factors understood best by those involved in the operation of

the college. The top administrators of Cuesta College were against the idea of seeking outside validation. The administration wanted to see the elements of this institutional research project conducted "in-house." Though they were in favor of an extensive literature review to point out how this type of research was being conducted in "the field," they felt that campus administrators, faculty, and students, have a better feel for the unique requirements of the college. Thus, the criteria for success in this study were decided by representative figures on the home campus. Administrators included in the formative committee (i.e., VP Instruction, VP Student Services, and Director of Research) served as an informal summative committee.

Class Description

Online distance students were taught according to the same course outline, used the same textbook, covered the same lecture material, and completed the same tests (multiple-choice, true-false) as the equivalent on-campus students. There were three main differences between on-campus and online groups: the delivery mode for the lectures, the mode of teacher/student and student/student communication, and the mode for the assignments.

The distance classes reviewed multimedia slides (PowerPoint presentations converted to HTML) and lecture notes online while the equivalent classes heard instructor lectures and participated in face-to-face discussion. The distance classes

made heavy use of a class web site and used a list serve and e-mail for online communication and discussion with other students and the instructor. The assignment load for the distance class students consisted almost entirely of Internet-based, independent assignments with some collaborative work done via the list serve. The equivalent class completed some online assignments but participated most frequently in classroom discussion assignments and other non-Internet assignments.

Data Collection and Analysis

All data were obtained (retrospectively) from the campus mainframe computer system and included subjects enrolled in the Spring and Fall of 1998, and the Spring of 1999 semesters. Collected data were entered into a spreadsheet program (Microsoft Excel) and analyzed for means, standard deviations, and percentages using the application's statistical macros. Charts and tables were created from the data using Excel's "Chart Wizard" and table functions, respectively.

Procedures

Six procedures were used to complete this applied dissertation. First, a review of literature was conducted. The literature review analyzed prior research, identified typical student success characteristics, and identified appropriate statistical measures to compare student characteristics and success in distance education courses.

Second, after obtaining informed consent (see appendix A), student demographics for the online ($N = 96$) and equivalent on-campus ($N = 135$) groups were extracted from the college mainframe computer system. Raw demographic data can be found in Appendix B. Other continuous and categorical variables were obtained using a distance education questionnaire developed by the formative committee. The distance education questionnaire can be found in Appendix C.

Third, raw scores for the Grasha-Riechmann Student Learning Style Scales (see Appendix D for GRSLSS instrument) were analyzed to compare the learning style differences between the online and equivalent on-campus students.

Riechmann and Grasha (1974) described the process for collection of construct validity data on the initial versions of the GRSLSS. Test-retest reliabilities (seven-day interval between testings) ranged (across scales) from .76 for the Dependent scale to .83 for the Independent scales ($N = 269$, Males = 119, Females = 150).

The GRSLSS was made up of 60 items (six scales, 10 items per scale). Students were asked to judge themselves using a five-point rating scale that ranges from strongly disagree (rating of 1) to strongly agree (rating of 5). Each student in both the online and equivalent on-campus classes completed this learning style inventory at the beginning of each semester. The inventory was self-scored by the student and raw scores were

obtained for each of the learning style categories. Raw scores for each student were also combined to get a mean group score.

In order to examine the patterns in the relationships among the learning styles within groups, the associations among different combinations of styles were studied. This was accomplished by calculating the correlation coefficients (Pearson product-moment) associated with the combinations of the six learning styles.

Fourth, data were collected and compared for the following indices: grade distribution, test scores, and student satisfaction. Student satisfaction inventories were administered to all students during the final exam week of each semester. The "Satisfaction Survey" was developed by the formative committee (survey instrument can be found in Appendix E).

Fifth, the online students were subdivided into sub-groups: academically successful (grade of "C" or better) and academically non-successful (grade of "D," "F," or "W"), and compared in terms of demographics, learning styles, and variables identified by the distance education questionnaire. Combined raw scores on the questionnaire can be found in Appendix F. Raw categorical data, split by AS/ANS, are included in Appendix G, and continuous data in Appendix H.

The structure for comparing successful and non-successful students was adapted from a study by Dille and Mezack (1991).

Their study assumed that a grade of "W" implied academic "non-success" (i.e., students were academically unable to succeed in the class). This has been a common assumption in the distance education literature and, at this time, there is no reason to assume otherwise. However, the current study was able to cast light on the validity of this assumption by suggesting student characteristics that might serve as better predictors of success. Results were reported descriptively and listed means, standard deviations, and/or percentages of each variable in tabular format.

Sixth, interpreting the data from the fifth procedure, the author reported the characteristics suggestive of success by citing the relatively larger mean score differences between the successful and non-successful groups. These characteristics established a "profile" of the successful online student.

Finally, the results were reported to the college administration, and to various stakeholder groups (e.g., Senate, Faculty Union) to help guide them in their decision-making processes with respect to distance education.

Assumptions

For this applied dissertation it was assumed that health education students in the online classes represented both current and future online health students. Second, it was assumed that the GRSLSS was a valid indicator of social learning

styles. The formative committee accepted the GRSLSS as a valid indicator of social learning styles.

Limitations

First, the study results were limited in that the results were specific to online health education students at Cuesta College. Second, the sampling technique used for the study was not random. The author employed non-probability (convenience) sampling by choosing his own class sections to study; thus, the results were further limited. Convenience sampling, in this case, was necessary because the author taught the only online classes offered on the campus. Further, non-random sampling was more appropriate to this type of research since students typically self-select into classes. Thus, the results of this study can be generalized to students who typically self-select into an online health education class. Third, because of the nature of the sub-groupings (successful vs. non-successful), there was a disproportionate number of students in each group.

Chapter 4

RESULTS

Review of Literature

For many years, researchers have endeavored to clarify questions regarding the quality of distance education. Numerous studies have attempted to determine the effects of distance modalities on student outcomes as a way of establishing whether distance education can provide the same level of academic excellence as courses taught in traditional modes. Many distance education studies have employed a true experimental design and have been devoted to comparative analysis of distance and traditional methods of education. Those researchers who conduct comparative research are often asking the same basic research question, "Is distance education as good as, or better than, traditional education?"

An evolution in learning theory has brought changing educational assumptions and has called into question the methods of traditional distance education research. Saba (1998) and Ehrmann (1995) have suggested that many studies are simply asking the wrong research questions. Saba recommended that research hypotheses focus on whether educational strategies are successfully engaging students, and whether or not there is effective communication and interaction between instructor and student to promote the construction of knowledge. This suggests that future research should not focus on the relative value of

technology-mediated modes of education *per se* but rather should determine whether students who enroll in distance education classes are as successful as their traditional counterparts and, more specifically, what factors are related to student success. The current study moved away from a modality-centered research focus toward one that compared student characteristics, profiled the successful online student, and evaluated student success.

A study by Dille and Mezack (1991) provided the general concept for the design of the present study. Their purpose was to identify predictors of high risk in community college telecourse students. The authors compared academically successful and non-successful students using a combination of variables which included gender, ethnicity, marital status, age, semester credit hours, average GPA, Rotter's Internal-External Locus of Control scale (RIELC), and Kolb's Learning Style Inventory (LSI).

Of the variables included in Dille and Mezack's study, only the RIELC, LSI, and marital status variables were not used. The GRSLSS was used in place of Kolb's LSI because the GRSLSS seemed to be the instrument of choice for use in a distance education study. The RIELC was not used because the GRSLSS addressed the same key factor as the RIELC: the determination of student beliefs about the nature of the learning environment (i.e., social learning preferences).

Since social isolation is a prominent feature of distance learning settings and since independent learning skills have been hypothesized as important requisites for success, it seemed reasonable to use a learning style instrument that addressed the social learning preference. The GRSLSS was chosen as the learning style instrument for the present study because it is designed specifically to be used with college/university students, because it addresses the "social dynamic" (i.e., the relative absence of social interaction normally found in distance courses) and because it promotes an optimal teaching/learning environment by helping faculty develop sensitivity to student/learner needs. The GRSLSS also prevents learning style stereotyping by providing the rationale for pursuing personal growth in weak, or underused, learning style areas.

Demographic data that are typically included in distance education research include age, gender, ethnicity, disability, location of residence, and life role status (Thompson, 1998, pp. 10-14). Affective characteristics have included personality type, learning style, and motivation (Thompson, pp. 14-18). The present study used each of the variables listed by Thompson except for disability, location of residence, and personality type. The author did not consider disabilities at this time since the number of subjects was relatively small. The author also did not consider location an important factor in the

current study. More and more, students are choosing distance education, not because it is the only alternative, but because it is the preferred alternative (Guernsey, 1998; Richards & Ridley, 1997; Thompson, 1998). Current research has confirmed that students are signing up for distance courses because they are convenient and because such courses meet their individual scheduling needs. With the availability of satellite campuses in three areas of the county, the Cuesta College administration was more interested in factors besides driving distance.

Student Characteristics

Demographics

Student demographics were obtained from the Cuesta College mainframe computer system. The author obtained comparative demographic data for distance education students (online), all students enrolled in health education classes (all-health), and all students enrolled at Cuesta College (all-campus). A table of all demographic data obtained can be found in Appendix B.

The ethnicity in distance courses heavily favored the "White" population (Table 1). Online classes consisted of 81.3% White, while all-health and all-campus were equally matched with 76.1% White students. Ethnic "minorities" made up a smaller proportion of the online classes (14.2%) compared to either the all-health (19.6%) or all-campus (20.2%) groups.

Table 1.

Student Ethnicity

Ethnic Group	Groups					
	Online		All-Health		All-Campus	
	<u>n</u>	%	<u>n</u>	%	<u>n</u>	%
White	78	81.3	445	76.1	6967	76.1
Asian	3	3.1	17	2.9	306	3.3
Black	2	2.1	13	2.2	169	1.8
Hispanic	7	7.3	66	11.3	1133	12.4
Filipino	1	1.0	8	1.4	125	1.4
Amer. Ind.	1	1.0	11	1.9	120	1.3
Other/Undeclared	4	4.2	25	4.3	336	3.7
Total	96	100.0	585	100.0	9156	100.0

The online classes also consisted of a slightly higher percentage of women (55.2%) compared to the all-health (53.9%) and all-campus (53.3%) groups (Table 2).

Table 2.

Student Gender

Gender	Groups					
	Distance		All-Health		All-Campus	
	<u>n</u>	%	<u>n</u>	%	<u>n</u>	%
Female	53	55.2	315	53.9	4850	53.3
Male	43	44.8	269	46.1	4249	46.7
Total	96	100.0	584	100.0	9099	100.0

The current student course loads are summarized in Table 3. The majority of online students were enrolled in less than 12 units (62.6%). This was higher than the all-campus (56.1%) and the all-health (45.6%) groups. The online group also exhibited a higher percentage of students enrolled in more than 15 units (9.4%) relative to all-health (7.4%) and all-campus (5.3%); thus, fewer online students were enrolled (28.1%) in the typical full time load range of 12-15 units compared to all-health (47.0%) and all-campus (38.6%) groups.

Table 3.

Current Student Course Load

Course Load	Groups					
	Online		All-Health		All-Campus	
	<u>n</u>	%	<u>n</u>	%	<u>n</u>	%
6 or fewer	30	31.3	113	19.3	2946	32.2
6.1-11.9	30	31.3	154	26.3	2190	23.9
12-15 units	27	28.1	275	47.0	3533	38.6
More than 15	9	9.4	43	7.4	487	5.3
Total	96	100.0	585	100.0	9156	100.0

Total prior college units completed are summarized in Table 4. The online group had 36.5% of its members completing 60 or more units. This was not similar to the all-health (8.5%), or all-campus (4.7%), groups. Further, 7.3% of the online students had completed a degree (Associate, Bachelors), compared to 2.2% for the all-health and 10.9% for the all-campus groups.

Table 4.

Student Level: Units or Degree(s) Completed

	Groups					
	Online		All-Health		All-Campus	
Units	<u>n</u>	%	<u>n</u>	%	<u>n</u>	%
Fewer than 30	32	33.3	405	69.2	6162	67.3
30-59.9 units	22	22.9	117	20.0	1559	17.0
60 or more	35	36.5	50	8.5	429	4.7
AA/AS Degree	1	1.0	6	1.0	645	7.0
BA/BS Degree	6	6.3	7	1.2	361	3.9
Total	96	100.0	585	100.0	9156	100.0

Age data for each group are summarized in Table 5. The percentage of students 21 years and under was 38.6 for the online group, compared to 73.7% for the all-health and 54.1% for the all-campus. The 22-50 year age group was 61.4% for the online, 25.4% for the all-health, and 42.3% for the all-campus groups, respectively. Thus, the online students were somewhat older than the all-campus and quite a bit older than the all-health, students.

Table 5.

Student Age

Age	Groups					
	Online		All-Health		All-Campus	
	<u>n</u>	%	<u>n</u>	%	<u>n</u>	%
17 and under	1	1.0	40	6.8	436	4.8
18 only	2	2.1	140	23.9	1246	13.6
19 only	11	11.5	112	19.1	1365	14.9
20-21	23	24.0	140	23.9	1903	20.8
22-25	22	22.9	84	14.4	1408	15.4
26-30	13	13.5	26	4.4	778	8.5
31-40	12	12.5	26	4.4	1007	11.0
41-50	12	12.5	13	2.2	682	7.4
51-65	0	0.0	1	0.2	267	2.9
Over 65	0	0.0	2	0.3	59	0.6
Undeclared	0	0.0	1	0.2	5	0.1
Total	96	100.0	585	100.0	9156	100.0

Learning Styles

A statistical test (i.e., t test) was used to compare the differences in average learning style scores between the online and on-campus groups. The average or mean scores of the distance learning class and the equivalent health education class on each of the six categories of the GRSLSS are shown in Table 6. Relatively larger differences in the average scores between the two classrooms occurred for the Independent and the

Dependent learning styles. Compared to those students enrolled in the traditional classroom, the students in the distance learning class had higher scores on the Independent learning style scale and lower scores on the Dependent learning style scale.

Table 6.

Comparison of Learning Style Means by Category

Class	n	<u>Learning Style Categories</u>					
		Independent	Avoidant	Collaborative	Dependent	Competitive	Participant
<u>Beginning of Semester Comparisons</u>							
Distance	94	3.57**	2.53	3.57	3.55**	2.36	3.74
Campus	40	3.26	2.46	3.81*	3.82	2.48	3.79

Note. Learning style scores are based on a five-point rating scale that ranges from strongly disagree (rating of 1) to strongly agree (rating of 5).

* $p < .05$. ** $p < .01$.

The t tests revealed that the differences in the average Independent, Collaborative, and Dependent scores between the two classrooms could not be attributed to chance; that is, they were statistically significant. The variations in average scores between the two classrooms on the Avoidant, Competitive, and Participant learning styles were relatively small and were not statistically significant.

Table 7 shows the values of the correlation coefficients for each possible combination of learning styles within the groups. Correlational analysis within the online group

indicated a significant negative relationship between the Independent learning style, and the Collaborative and Dependent learning styles. In other words, a higher Independent learning style score was associated with lower Collaborative and Dependent scores. A second important relationship (positive correlation) was found between the Collaborative and the Dependent learning styles. That is, higher Collaborative scores were generally associated with corresponding high scores in the Dependent style.

In the equivalent on-campus group, significant positive relationships were found between the Collaborative learning style and the Competitive and Participant styles. Another positive correlation was found between the Competitive and Participant styles of learning.

Table 7.

Intercorrelations Between Learning Style Scales for Online and Equivalent On-Campus Students

Scale	1	2	3	4	5	6
Online students (N = 94)						
1. Independent	--	-0.13	-0.37**	-0.38**	0.16	0.10
2. Avoidant		--	-0.05	0.10	-0.01	-0.67**
3. Collaborative			--	0.34**	-0.12	0.17
4. Dependent				--	0.03	0.17
5. Competitive					--	0.20
6. Participant						--
Equivalent on-campus students (N = 40)						
1. Independent	--	-0.20	0.10	-0.12	0.13	0.09
2. Avoidant		--	-0.37*	-0.12	-0.01	-0.67**
3. Collaborative			--	0.27	0.51**	0.52**
4. Dependent				--	0.15	0.31
5. Competitive					--	0.46**
6. Participant						--

Note. Learning style scores are based on a five-point rating scale that ranges from strongly disagree (rating of 1) to strongly agree (rating of 5).

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

Student Success

Academic Success

Academic success (AS) was defined as a grade of "C" or better, and academic non-success (ANS) as a grade of "D," "F," or "W." The numbers of students receiving each grade were converted to a percent of total and are summarized in Figure 1.

Though the distance group received nearly twice as many "A" grades as did the equivalent group (25.0%, 12.9%), the attrition rate of the distance group was nearly twice that of the equivalent group (13.5%, 7.2%). On the other hand, the equivalent group received more "B," "C," "D," and "F" grades.

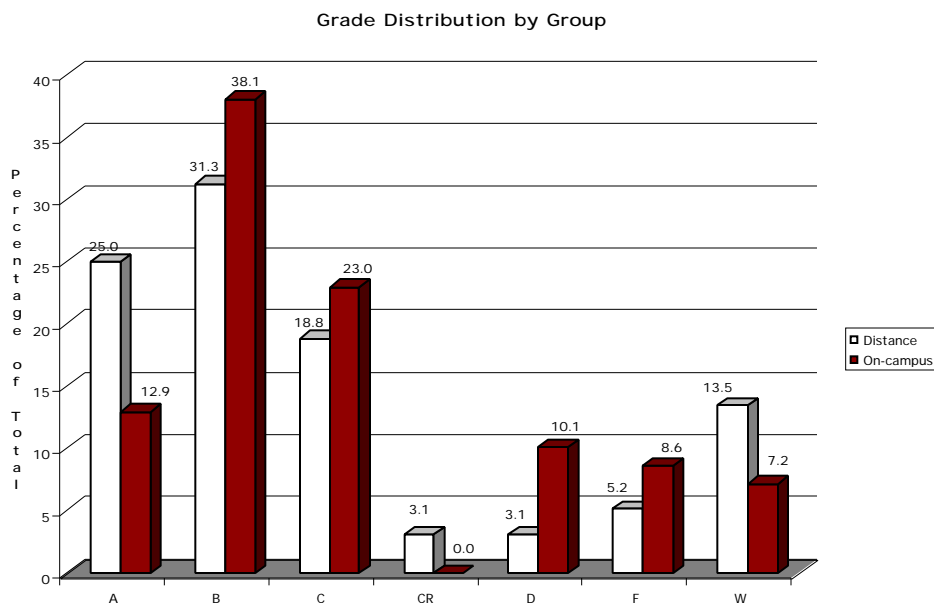


Figure 1. Grade distribution by group

AS and ANS were reported as a percentage of students and are summarized in Figure 2. AS (78.1%, 74.1%) and ANS rates (24.6%, 25.9%) were similar between distance and equivalent on-

campus groups respectively. Online students were somewhat more successful than the equivalent on-campus comparison group.

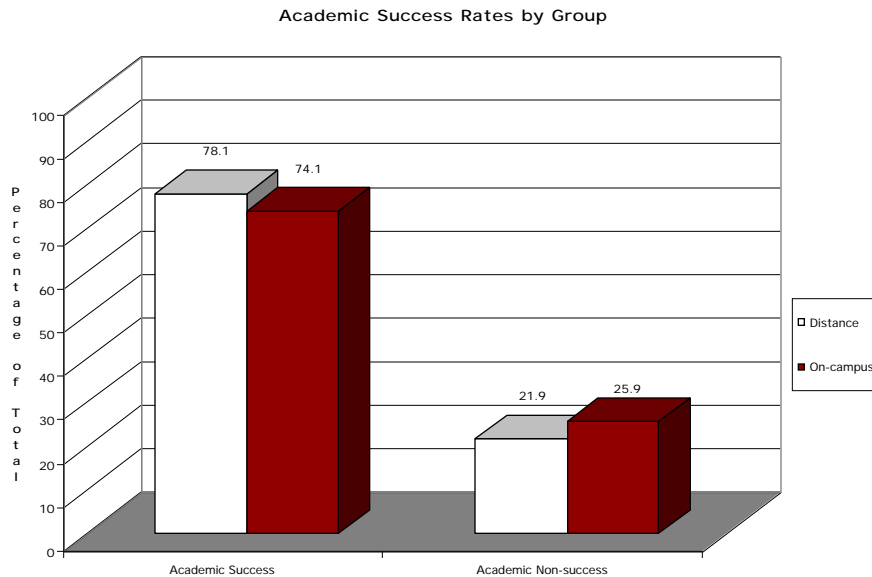


Figure 2. Academic success rates by group

Test Scores

Student test scores are summarized for both the distance and equivalent groups in Figure 3. Test raw scores appear in Appendix I.

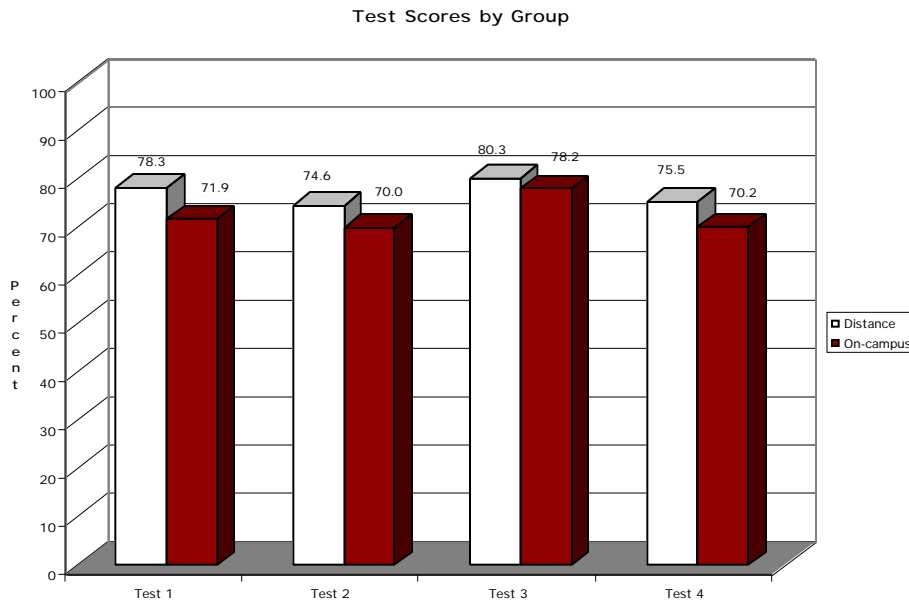


Figure 3. Test scores by group

Distance students consistently outperformed equivalent class students on semester exams. Mean test scores for the distance group were higher on each of the four semester exams. The best exam scores for both groups were obtained on test 3 (80.3%, 78.2%). Scores on test 2 were the lowest for both distance (74.6%) and equivalent (70.0%) groups.

Satisfaction

Student satisfaction measures were obtained by administering a Student Satisfaction Survey (Appendix E), and are summarized in Figure 4. The Likert-type survey questions (SQ) measured student satisfaction in the areas of class structure (SQ1-2), instructor (SQ3-4), class materials (SQ5-8), and overall experience (SQ9-11). Two questions (SQ7,8) were applicable only to the distance group. These questions rated satisfaction with the class web site and companion CD-ROM.

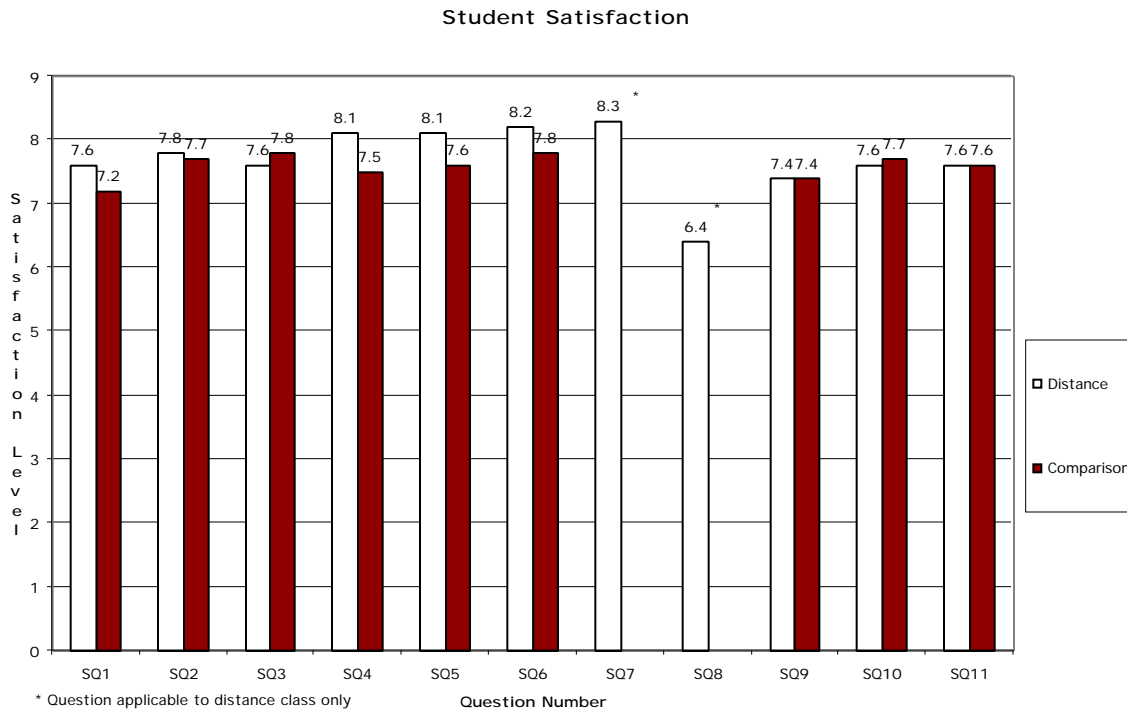


Figure 4. Student satisfaction

Satisfaction levels for all questions except SQ8 were rated between 7.1 to 8.3 on the nine-point scale. A score of 7.0 was equivalent to a response of "Satisfied," and a score of 9.0 "Very Satisfied." Student satisfaction levels of the distance group were at or above those of the equivalent group on every question except SQ3. The highest rating for any question (8.4) was given on SQ7 that asked students to rate the class web site in terms of its efficacy in aiding student success. The lowest rating (6.4) was given on SQ8, which asked students to rate the effectiveness of the optional CD-ROM in aiding student success.

Student Success Profiles

Gender/Ethnicity

Women were more successful in the online course (Table 8).
Sixty percent of the AS online students were women.

Table 8.

Gender and Academic Success

Gender	Groups			
	Successful		Non-Successful	
	<u>n</u>	%	<u>n</u>	%
Male	30	40.0	13	61.9
Female	45	60.0	8	38.1
Total	75	100.0	21	100.0

Though disproportionately represented, the White ethnic group was relatively less successful (see Table 9) in the online class. Of the 12 (14.5% of sample) ethnic minority students, 11 (91.6%) were AS in the course. Though the White ethnic group made up 81.3% of the online population, only 78.7% were AS, while 90.5% of the ANS students were White.

Table 9.

Ethnicity and Academic Success

Ethnicity	Groups			
	Successful		Non-Successful	
	<u>n</u>	%	<u>n</u>	%
White	59	78.7	19	90.5
Asian	2	2.7	1	4.8
Hispanic	7	9.3	-	0.0
Filipino	1	0.0	-	0.0
Black	2	2.7	-	0.0
Other/Undeclared	4	5.3	-	0.0
Total	75	100.0	21	100.0

Note. There were no students in the ANS group who belonged in the Hispanic, Filipino, Black, or Other/Undeclared categories.

Income Level

Gross annual household income for AS and ANS online students is summarized in Table 10. ANS students whose income was in the \$20-\$40,000 range (23.8%) nearly doubled that of AS students (12.9%). Over 16 percent of AS students had household incomes between \$61,000 and \$80,000 compared to 0.0% for the ANS. However, nearly 20 percent of ANS students had incomes greater than \$80,000 compared to 11.3% for the AS students.

Table 10.

Income Level and Academic Success

Income Level	Groups			
	Successful		Non-Successful	
	<u>n</u>	%	<u>n</u>	%
\$0 - \$20,000	29	46.8	9	42.9
\$20,001 - \$40,000	8	12.9	5	23.8
\$40,001 - \$60,000	8	12.9	3	14.3
\$61,000 - \$80,000	10	16.1	-	0.0
Greater than \$80,000	7	11.3	4	19.0
Total	62	100.0	21	100.0

Note. There were no students in the ANS group whose gross household income was in the \$61,000 to \$80,000 range.

Continuous Variables

Selected continuous variables for online students are split by academically successful (AS), and academically non-successful (ANS) students, and are reported in Table 11. AS online students had a higher cumulative college GPA (\underline{M} = 3.02, 2.25), and current course load (\underline{M} = 9.54, 7.79).

Table 11.

Selected Continuous Variables and Academic Success

Variables	Groups					
	Successful			Non-Successful		
	<u>n</u>	<u>M</u>	<u>SD</u>	<u>n</u>	<u>M</u>	<u>SD</u>
Prior college GPA	75	3.02	0.66	21	2.25	0.95
Prior college units	75	36.05	29.09	21	37.40	36.30
No. of Dependents	42	0.62	0.99	13	0.46	0.97
Hours work	62	22.69	15.88	17	20.47	14.16
Units attempted	75	9.65	4.85	21	6.64	5.10
WWW expertise	72	3.38	1.07	21	3.67	1.39
E-mail expertise	72	3.26	1.27	21	3.62	1.20
Motivation	71	4.44	0.73	21	4.43	0.60
Age	75	26.81	8.05	21	26.00	9.99

There were only minimal differences between the groups in prior college units attempted, number of dependents, hours worked per week, motivation, and age variables. ANS online students had a higher self-perceived expertise (on a 5 point scale) in the use of the WWW (3.67, 3.38) and E-mail (3.62, 3.26) technologies.

Learning Styles

GRSLSS mean scores are summarized in Table 12. Both AS and ANS online students preferred Independent, Collaborative, Dependent, and Participant learning environments relative to

Avoidant or Competitive settings. T tests did not reveal any significant differences between AS and ANS groups in mean learning style scores.

Table 12.

Learning Styles and Academic Success

Learning Styles	Groups					
	Successful			Non-Successful		
	<u>n</u>	<u>M</u>	<u>SD</u>	<u>n</u>	<u>M</u>	<u>SD</u>
Independent	74	3.58	0.55	20	3.54	0.52
Avoidant	74	2.48	0.64	20	2.73	0.57
Collaborative	74	3.52	0.69	20	3.75	0.51
Dependent	74	3.59	0.54	20	3.40	0.56
Competitive	74	2.36	0.65	20	2.40	0.54
Participant	74	3.78	0.54	20	3.59	0.58

Note: Learning style scores are based on a five-point rating scale that ranges from strongly disagree (rating of 1) to strongly agree (rating of 5).

Table 13.

Intercorrelations Between Learning Style Scales Among Successful
and Non-successful Online Students

Scale	1	2	3	4	5	6
Successful online students (N = 74)						
1. Independent	--	-0.15	-0.46**	-0.43**	0.13	0.12
2. Avoidant		--	-0.06	0.21	-0.07	-0.65**
3. Collaborative			--	0.32**	-0.15	0.12
4. Dependent				--	0.03	0.04
5. Competitive					--	0.20
6. Participant						--
Non-successful online students (N = 20)						
1. Independent	--	-0.01	0.14	-0.32	0.29	-0.01
2. Avoidant		--	-0.15	-0.23	-0.45*	-0.69**
3. Collaborative			--	0.60**	0.09	0.54*
4. Dependent				--	0.00	0.55*
5. Competitive					--	0.21
6. Participant						--

Note. Learning style scores are based on a five-point rating scale that ranges from strongly disagree (rating of 1) to strongly agree (rating of 5).

*p < .05, two-tailed. **p < .01, two-tailed.

Correlational analysis within the AS group indicated a significant negative relationship between the Independent learning style, and the Collaborative and Dependent learning

styles. Another important relationship (positive correlation) was found between the Collaborative and Dependent styles. The most significant finding for ANS students was a positive correlation between the Collaborative and Dependent styles.

Chapter 5

DISCUSSION, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Discussion

Historically, distance education research has focused on determining the effectiveness of distant modalities compared to traditional modes of instruction. The current study, instead of comparing instructional modes, compared student characteristics and evaluated student success.

Comparing Selected Student Characteristics

Demographic data in the current study revealed that online health education students exhibited different characteristics when compared to either all-health or all-campus students. Splitting the online students into academically successful (AS) and non-successful (ANS) groups provided a basis for establishing characteristics associated with success in an online environment.

The White ethnic group was disproportionately represented in online classes (81.3%) compared to all-health (76.1%) and all-campus (76.1%) groups. This characteristic has not only been reflected in the literature, but is also a concern of many faculty and administrators at Cuesta College. Thompson (1998, p. 11) indicated that, though research studies sometimes report the percentages of participants from different ethnic backgrounds, they usually do not *compare* these with the same groups within the population of traditional students. The

current study attempted to make this kind of comparison as a more valid indicator of minority participation in online courses, and also to provide an important "baseline" for future studies. It is important that distance education serve students equitably and not become a dichotomy of "haves" and "have nots."

There was some evidence that, though represented to a lesser extent, ethnic "minorities" were relatively more successful than Whites. If Whites make up nearly 82% of the online population, then, all things being equal, they would be expected to be represented to the same extent in both AS and ANS groups. Though Whites made up 81.3% of the online students, they accounted for nearly 91% of the ANS group. On the other hand, though ethnic minorities (Asian, Black, Hispanic, Filipino, and American Indian) comprised 14.2% of the online population, they made up only 4.8% of the ANS group. It will be interesting to see if this favorable performance status for minority students persists. A question that still needs to be answered is "Why aren't more ethnic minorities enrolling into online classes?" It is possible that minority students haven't had as many opportunities to be exposed to computer technologies. In fact, it may be that minority students come from households with lower incomes and thus have not had access to their own computer systems.

Some Cuesta personnel assert that the minorities represented in this study do not match the profile of a socio-

economically underprivileged minority population. Academically successful students in this study were more likely to live in a household with a higher yearly gross income. Academically successful students were more likely to have household incomes over \$60,000 (27.4%) compared to ANS students (19.0%). ANS students, on the other hand, were nearly twice as likely (23.8%, 12.9%) to have household incomes between \$20,000 and \$40,000. Based on the favorable performance results for minorities, it is possible that AS minorities are more likely to come from higher income households. Future studies should explore a possible relationship between income and AS. In any case, there seems to be no reason to discourage minorities from taking online courses as the evidence in this study suggests they will be successful.

Women were represented to a greater extent in the online classes (55.2%) versus the all-health (53.9%) and all-campus (53.3%) groups. This supports a general trend in the literature for higher enrollment by women in distance courses (Thompson, 1998; Burge, 1998). Further, female online students were more successful than their male counterparts. The AS group was comprised of 60.0% women, and the ANS group only 38.1% women. Thus, not only were women more likely to enroll into online courses, in this case, they appeared better equipped to handle the challenges of the online learning environment with greater success.

The online student was more likely to be enrolled in fewer than 12 units *and* more than 15 units. Thus, the online student did not resemble a typical full-time student at Cuesta College (i.e., those enrolled in 12-15 units). Further, the online students were decidedly older than the all-health or all-campus groups. Nearly 62% of the online students were between 22-50 years, compared to 25.4% for the all-health and 42.3% for the all-campus. These results support the literature, which indicates that distance education students are older than their on-campus counterparts (Thompson, 1998).

Comparing Student Learning Styles

The broad range of learning style scores across categories demonstrated the variety of learning styles in both groups and illustrated the diversity of the distant student as noted by Thompson (1998). An instructor using the present data could plan learning opportunities that would emphasize the learning preferences of each of the commonly preferred learning styles (i.e., Independent, Dependent, Collaborative, and Participant), thus matching teaching strategies with learning styles.

Of particular interest were the significant differences between the groups in the Independent and Dependent categories. A previous study by Diaz and Cartnal (1999) demonstrated that online students tended to be significantly more Independent and significantly less Dependent learners than their on-campus counterparts. The present study confirmed these results. It is

not surprising that students who prefer independent, self-paced instruction would self-select into an online class. It may be that the distance education format appealed to students with independent learning styles, and that independent learning preferences are well suited to the relative isolation of the distance learning environment. This interpretation would agree with Gee (1990) who noted that successful telecourse students favored an independent learning style. This also agrees with James and Gardner (1995) who suggested that distance education students who favored reliance on independent learning skills would be more suited to a distance format. As a result of these significant differences, instructional strategies in the distance class should emphasize relatively more independent and fewer dependent learning opportunities. This approach has practical significance given that instructors often complain of too little "class time" to devote to learning objectives. Armed with learning style data, instructors can more efficiently allocate instructional time to various learning activities.

In the present study, though there were no significant differences in learning style scores between AS and ANS students; the AS students were more strongly independent learners as evidenced by intercorrelation analysis. AS students' independent styles of learning were negatively related to their need for collaboration and dependence in the learning environment. That is, the preference for independence by AS

students was not tied to needs for external structure and guidance from their teacher (dependence) or a need to collaborate with their classmates. This correlation did not exist in the ANS students. Thus, a significant trait of the AS online student was a strong, independent learning preference.

The ANS group perceived themselves as having a higher level of WWW and e-mail expertise than the AS group. While this could mean that technology expertise is not critical to success in an online course, it is more likely explained within the context of other offsetting factors. Though ANS students seemed to have sufficient technical skills to excel in an online course (based on their self-perceived expertise levels), they may not have performed well due to their avoidant attitude toward the health education course in general. Since health education is a general education requirement at Cuesta College, it is possible that some students may feel that they are participating against their will. Further, the ANS students may lack motivation for academic studies in general, as exhibited by their lower cumulative GPAs. Though a certain minimal level of technical expertise is most likely needed to succeed in an online environment, the more important factors are apparently related to prior academic success (i.e., GPA), and possessing a strongly independent learning style.

Prior college GPA, hours worked per week, and current attempted units, were higher in the AS group. AS students had a

higher cumulative college GPA (\underline{M} = 3.02) compared to the ANS group (\underline{M} = 2.25), worked more hours per week (22.69, 20.47), and were attempting more units in the current semester (9.65, 6.64). These characteristics suggested that successful online students have proven to be good students in prior coursework (i.e., overall GPA) and are confident in their ability to master both work and academic responsibilities. These results agree with Dille and Mezack (1991) who reported that successful telecourse students were likely to have higher than 2.9-3.0 GPA.

Standard deviation (\underline{SD}), which is a measure of variability, indicates how widely scores are distributed from the mean. There were such large deviations in prior college units, hours of work, dependents, units attempted, motivation, and age categories between AS and ANS groups, that it was not possible to make generalizations about characteristics suggestive of success in these areas.

There were two indices that were suggestive of success in an online class. First, prior college GPA for the AS group (\underline{M} = 3.02, \underline{SD} = 0.66) was very different than that of the ANS group (\underline{M} = 2.25, \underline{SD} = 0.95). The \underline{SD} was relatively smaller, and indicated that 84% of the AS group would have a prior college GPA over 2.36. Second, successful online students are likely to have a strong independent learning style preference. This trait was more difficult to establish since there was not a significant difference in the mean independent learning style

scores between AS and ANS students. However, within-group correlations pointed out that AS students were strongly independent, since their independence was not tied to needs to be collaborative or dependent.

Evaluation of Student Success

Schutte (1997) reported better test scores for online classes. He suggested that students may have compensated for deficiencies in the online course construct by initiating collaboration with their peers. Schutte attributed student success on tests to collaboration with peers, not to the online delivery technology. Mean test scores for the distance group in the current study were higher than for the equivalent on-campus group on each of the four semester tests. There are numerous factors that could have been responsible for this result. The type of tests that were given to students in the present study were objective multiple-choice, true-false tests. Though it is unclear which of the possible factors could be responsible for the higher test scores in the current study, it seems very clear that students who enroll and persist in an online course will fare at least as well as their on-campus counterparts.

The attrition rate for the online group in the current study was nearly twice that of the equivalent group (13.5%, 7.2%). Ridley and Sammour (1996) found a high withdrawal rate for online students over two semesters—of 30 and 25 percent, respectively, which is much higher than the present study.

Gibson (1998) reported three models that have emerged to explain and predict attrition in distance courses:

- Student factors: educational preparation, motivational and persistence attributes, student academic self-concept
- Situational factors: family and employer support, and changes in life circumstances
- Educational system factors: quality and difficulty of instructional materials, and provision of tutorial support

In the current study, there was no attempt to find out why distance students dropped out more often than on-campus students. However, indirect evidence suggested that there may be different reasons for attrition in online versus on-campus students. Online students were older, were more likely to have completed 60 or more college units, and were more likely to be independent learners. This type of profile suggests a student who has had more life and academic experiences, and who is well suited for independent and self-directed study. Why would this type of student drop an online course? In traditional classes, students often think they are progressing satisfactorily simply because they attend class on a regular basis. This false sense of security may last until deep into the term when it's too late to drop. No false assurances develop in the online environment. Student's progress is based on the completion and quality of their work. An older, more academically proficient student may be more likely to recognize an intractable situation and opt to

drop early. It is also possible that such a student is dropping for reasons other than academic performance; such as family, work, or other scheduling or time conflicts. Perhaps, in this case, dropping the class is exactly what *should* have been done. This phenomenon will need to be addressed in future studies.

Academic success (percentage of students receiving a "C" grade or better) was slightly higher (78.1%, 74.1%), and non-success ("D," "F," or "W") slightly lower (21.9%, 25.9%), for the distance group. Students who persisted in the online classes displayed a high level of success as evidenced by the greater number of "A" grades and fewer number of "D" and "F" grades.

Due to the timing of the development and completion of the student satisfaction survey, it was only possible to survey two distance ($n = 56$) and two on-campus ($n = 69$) classes. Students in the distance group were as satisfied, or more satisfied than their on-campus counterparts on every item surveyed by the student satisfaction instrument. These results were consistent with Richards and Ridley (1997), who reported high student satisfaction with online instruction. Of the 69 students surveyed in their study, 79 percent rated their distance instruction as "Good" to "Excellent."

Of particular interest in the current study was the very high rating (8.4) given to the class web site. This web site received the 1998 "Model Multi-sensory Showcase Award" from the

Community College Foundation, for its outstanding design and instructional features. The high student satisfaction rating serves as an important validation of the award and may justify the use of this web site as a model for other instructional web sites on campus. Equally interesting was the relatively low score for the CD-ROM. This CD/web hybrid, created by the instructor, was modeled after the web site and was designed to deliver complex multimedia files while preserving the connectivity of the Web. The CD-ROM was optional; thus, only six students rated this survey question. Further, these students rated the first version of the hybrid CD. Two subsequent versions have addressed student feedback; thus, it will be interesting to see how the CD is rated in the future.

Conclusions

Differing Student Characteristics

It was concluded that students enrolled in online health education classes at Cuesta College would likely be older, more academically experienced, and have a current course load not typical of the all-health or all-campus students (i.e., load was not in the 12-15 unit range). Online classes would be likely to contain a higher percentage of the White ethnic population and more female students, when compared to all-health and all-campus groups.

Evaluation of Student Success

It was concluded that students enrolled in an online health education class would be as, or more, successful than equivalent on-campus students, when success was measured by exam scores, obtaining a grade of "C" or better, and by student satisfaction. However, online students dropped out of online classes nearly twice as often as equivalent on-campus students; thus, online courses represent a real risk for potential students who are not adequately prepared, or whose profile does not match that of the successful online student.

Profile of Successful Student

It was concluded that female students would be more likely to succeed in an online class. Ethnic minorities, though under-represented, are likely to be more successful than the White ethnic majority. It was also concluded that successful online students would exhibit an average prior college GPA of 3.02 (with 84% above 2.36), and display strongly independent learning styles.

Implications

Distance education will clearly play an important role in the future of higher education. As increasing student enrollment threatens to overfill educational facilities, online education is poised to meet student needs for access. Further, distance education can deliver "just as needed" education to potential student populations which have previously been

unserved or underserved: those with work and scheduling conflicts, the geographically isolated, and the disabled.

As the WWW continues to become an important medium for educational delivery, more and more courses will be offered in an online format. Though faculty may attempt to utilize the same teaching methods in a distance environment that they employ in an equivalent on-campus class, the data from the current study suggest that faculty will encounter significantly different learning preferences as well as other different student characteristics.

Gibson (1998) challenged distance education instructors to "know the learner" (p. 140). She noted that distance learners are a heterogeneous group, and that instructors should design learning activities to capitalize on this diversity (p. 141). Since the dynamic nature of the distance population precludes a "typical" student profile (Thompson, 1998, p. 9), instructors should continually assess student learner characteristics. Further, since student characteristics are in constant flux (Thompson, 1998), the usual requirement for broad generalization in research may need to be abandoned in favor of a model that continuously monitors student characteristics, and determines which characteristics facilitate favorable outcomes. This student- and learning-centered approach to research would likely influence educational practice by helping to increase faculty

sensitivity to the individual learner and help them prepare for and facilitate distant education.

Faculty should use learning style inventories, surveys, questionnaires, and the resulting data, for the purpose of facilitating class preparation, designing class delivery methods, choosing educational technologies, and developing sensitivity to differing student learning preferences within the distance education environment. Finally, to help insure student success, students should be effectively counseled toward or away from distance learning classes on the basis of characteristics suggestive of success and non-success.

Recommendations

It is recommended that Cuesta College continue to support research to determine the overall effectiveness of online distance education. Continual research should compare the success and non-success of online students with their equivalent on-campus counterparts using the continuous and categorical variables identified in this study. This type of comparison will help to determine whether or not there are success characteristics that are unique to the online distance setting. Future research should also attempt to evaluate student success by comparing online and equivalent on-campus students and by profiling student characteristics. Some attempt should be made to study the possible relationship between household income and

success and also determine why students tend to drop online classes more often.

It is also recommended that Cuesta develop a template that will allow faculty to easily assess student characteristics. Assessing student characteristics can help faculty to tailor their teaching to the preferences of the learner. A campus task force should be convened to develop this template.

Further, prospective online students should be informed of the unique profile of successful online students: possessing an average prior college GPA of 3.02 (84% were above 2.36) and possessing a strongly independent learning style. This information will be useful in alerting students to the different skills and capacities that play a role in success in the online environment. Faculty should be apprised of students who enroll in online classes who do not fit the successful profile. This information might help faculty to initiate early interventions to promote student success and develop more sensitivity to the diverse characteristics and capacities that promote student success.

Finally, the college should disseminate the salient points of this research to the employees of the college through appropriate channels. This would include reports to committees, organizations (i.e., faculty senate), staff development days, and in the employee newsletter.

BIBLIOGRAPHY

Academic Plan. (1998). California Virtual University [Online]. Available:
http://california.edu/Faculty/AcademicPlan/academic_plan.html

Academic Senate for California Community Colleges. (1997, Fall). Guidelines for good practice: Technology mediated instruction. Sacramento, CA: Academic Senate.

Andrews, D. (1996). CD-ROM weds the web. Byte [Online], 21(11). Available: <http://proquest.umi.com/>

Bazillion, R. J., & Braun, C. (1998, April). Teaching on the web and in the studio classroom. Syllabus, pp. 37-39.

Berge, Z. (1998). Concerns of online teachers in higher education. Paper presented at Tel-Ed 98 [Online]. Retrieved October 13, 1999 from the WWW. Available:
<http://jan.ucc.nau.edu/~mpc3/berge/iste98.html>

Berge, Z., & Collins, M. (1995). Computer-mediated communication and the online classroom in distance learning. Computer-Mediated Communications Magazine [On-line], 2(4), 6-12. Available: <http://sunsite.unc.edu/cmc/mag/1995/apr/berge.html>

Biner, P. (1995). Distance learner attitudes, demographics, and personalities and their relationships to college-level course performance. Invitational Research Conference in Distance Education. The American Center for the Study of Distance Education.

Biner, P., & Dean, R. S. (1997, June). Profiling the successful tele-education student. Distance Education Report, 1, 1-3.

Biner, P., Dean, R., & Mellinger, A. (1994). Factors underlying distance learner satisfaction with televised college-level courses. American Journal of Distance Education (8)1, 60-71.

Biner, P., Bink, M., Huffman, M., & Dean, R. (1995). Personality characteristics differentiating and predicting the achievement of televised-course students and traditional-course students. American Journal of Distance Education (9)2, 46-60.

Birkey, R. C., & Rodman, J. J. (1995). Adult learning styles and preference for technology programs [Online]. Available March 17, 1999:
<http://www2.nu.edu/nuri/llconf/conf1995/birkey.html>

Blackmore, J. (1996). Pedagogy: Learning styles. Available: <http://granite.cyg.net/~jblackmo/diglib/styl-a.html>

Boettcher, J. V. (1997, November/December). Internet pitfalls: What not to do when communicating with students on the internet. Syllabus, pp. 46, 50, 52.

Boshier, R., Mohapi, M., Moulton, G., Qayyum, A., Sadownik, L., & Wilson, M. (1997). Best and worst dressed web courses: Strutting into the 21st century in comfort and style. Distance Education, 18(2), 327-349.

Brenner, J. (1997). An analysis of student's cognitive styles in asynchronous distance education courses at a community college. (ERIC Document Reproduction Service No. ED 415 924)

Brown, A. (1997). Designing for learning: What are the essential features of an effective online course? Australian Journal of Educational Technology, 13(2), 115-126.

Brown, G., & Wack, M. (1999, May). The difference frenzy and matching buckshot with buckshot [On-line]. Retrieved May 12, 1999 from the WWW. <http://horizon.unc.edu/ts/reading/1999-05.asp>

Burge, E. (1998). Gender in distance education. In C. Gibson (Ed.), Distance learners in higher education: Institutional responses for quality outcomes (pp. 25-45). Madison, WI: Atwood.

Burgess, W. E. (1997). The Oryx guide to distance learning (2nd ed.). Phoenix, AZ: The Oryx Press.

Campbell, J. O. (1998, May). Asynchronous learning networks: Evaluating anytime/anywhere learning. Paradigm Shift International: Otherwise [Online], Available: <http://www.parshift.com/OtherWise5.htm>

Canfield, A. (1980). Learning styles inventory manual. Ann Arbor, MI: Humanics Media.

Carman, J., & Boynton, D. (1997). To internet or not to internet: A case study. CBT Solutions [Online]. Available: http://www.cbtsolutions.com/cbtsolutions/html/m_onli.htm

Chen, L. L. (1997, July/August). Distance delivery systems in terms of pedagogical considerations: A reevaluation. Educational Technology, 37, 34-37.

Chizmar, J. F., & Williams, D. B. (1997). Internet delivery of instruction: Issues of best teaching practices, administrative hurdles, and old-fashioned politics. Paper presented at the 1997 CAUSE annual conference [Online]. Retrieved March 18, 1999 from the WWW. Available: <http://www.educause.edu/ir/library/html/cnc9703/cnc9703.html>

College Plan: 1998-2000. (1998). Cuesta College, San Luis Obispo: CA.

Collins, M. (1997). Developing & running a WWW biology course. The American Biology Teacher, 59, 594-596.

Cook, T. D., & Campbell, D. T. (1979). Quasi-experimentation: Design & analysis issues for field settings. Boston, MS: Houghton Mifflin.

Cookson, P. (1990). Persistence in distance education. In M.G. Moore (Ed.), Contemporary issues in American distance education. London: Falmer Press.

Cranton, P. (1994). Self-directed and transformative instructional development. Journal of higher education, 65(6), 727-744.

Davie, L. E. (1995). Times of turbulence and transition in distance education: Needed research in computer-mediated communication (CMC) course design. [Online]. Retrieved September 10, 1997 from the World Wide Web. Available: <http://www.oise.on.ca/~ldavie/NeededResearch.html>

Diaz, D. P. (1999a). CD/Web hybrids: Delivering multimedia to the online learner. Journal of Educational Multimedia and Hypermedia, 8(1), 89-98.

Diaz, D. P. (1999b). Evaluation of student success in an online health education course. Unpublished research practicum, Nova Southeastern University, Fort Lauderdale, FL.

Diaz, D. P. (1999c). Profiling successful and non-successful online health education students. Unpublished research practicum, Nova Southeastern University, Fort Lauderdale, FL.

Diaz, D. P., & Cartnal, R. B. (1999). Students' learning styles in two classes: Online distance learning and equivalent on-campus. College Teaching 47(4), 130-135.

Dille, B., & Mezack, M. (1991). Identifying predictors of high risk among community college telecourse students. The American Journal of Distance Education, 5(1), 24-35.

Dowdall, R. J. (1991). Learning style and the distant learner. Consortium project extending the concept and practice of classroom based research report. (ERIC Document Reproduction Service No. ED 348 117)

Downes, S. (1998, Fall). The future of online learning. Online Journal of Distance Learning Administration [Online]. Retrieved March 17, 1999 from the WWW. Available: <http://www.westga.edu/~distance/downes13.html>

Duffy, T. M., & Cunningham, D. J. (1998). Constructivism: Implications for the design and delivery of instruction. In D. H. Jonassen (Ed.), Handbook of research for educational communications and technology. New York, NY: Simon & Schuster Macmillan.

Dunn, R., Dunn, D., & Price, G. E. (1977). Diagnosing learning styles: A prescription for avoiding malpractice suits. Phi Delta Kappan 58, 410-420.

Dwyer, F. M. (1990). Enhancing the effectiveness of distance education: A proposed research agenda. In M. G. Moore (Ed.), Contemporary issues in American distance education. New York, NY: Pergamon Press.

Ehrman, M. (1990). Psychological factors and distance education. The American Journal of Distance Education, 4(1), 10-24.

Ehrmann, S. C. (1995, March/April). Asking the right question. Change, 29(2), 20-27.

Findley, B., & Findley, D. (1997). Strategies for effective distance education. Contemporary Education, 68(2), 118-120.

Gadbow, N. F., & Hannah, S. A. (1997). Societal trends: Some implications for postsecondary and higher education. In K. E. Varcoe & L. J. Zachary (Eds.), Book of readings: Societal factors affecting education (pp. A1: 1-9). Fort Lauderdale, FL: Programs for Higher Education, Nova Southeastern University.

Gardiner, L. F. (1998). Why we must change: The research evidence. The NEA Higher Education Journal, pp. 71-88.

Gee, D. G. (1990). The impact of students' preferred learning style variables in a distance education course: A case study. (ERIC Document Reproduction Service No. ED 358 836)

Gibson, C. C. (1998). The distance learners academic self-concept. In C. Gibson (Ed.) Distance learners in higher education: Institutional responses for quality outcomes. pp. 65-76. Madison, WI: Atwood.

Gladieux, L. E., & Swail, W. S. (1999). The virtual university & educational opportunity: Issues of equity and access for the next generation. Washington, DC: The College Board.

Gordon, H. R. D. (1996). Analysis of productivity and learning style preferences of participants in distance education. (ERIC Document Reproduction Service No. ED 397 132)

Grasha, A. F. (1996). Teaching with style. Pittsburgh, PA: Alliance.

Green, K. C. (1997a). Campus computing 1997. Encino, CA: Campus Computing.

Green, K. C. (1997b). Money, technology, and distance education. [Online]. Available: http://www.adec.edu/clemson/papers/green_money.html

Green, K. C. (1997c, October). Think twice and businesslike about distance education. AAHE Bulletin, pp. 3-6.

Green, K. C. (1998). Campus computing 1998. Encino, CA: Campus Computing.

Green, K. C. (1999). Campus computing 1999. Encino, CA: Campus Computing.

Gregorc, A. G. (1982). An adult's guide to style. Maynard, Miss: Gabriel Systems.

Guenette, D. R., & Gustavson, R. (1996). CD-ROM and web browsers: HTML as the lingua franca. E Media Professional [Online], 9(8). Available: <http://proquest.umi.com/>

Guernsey, L. (1998, March 27). Colleges debate the wisdom of having on-campus students enroll in on-line classes. The Chronicle of Higher Education [Online]. Available: <http://chronicle.com>

Haney, J. P. (1999, April). Two groups hail report criticizing technology-delivered education. Deseret News [Online]. Retrieved April 15, 1999 from the WWW. Available: <http://deseretnews.com>

Hanson, R. E., & Jubeck, T. (1999). Assessing the effectiveness of web page support in a large lecture course online. DEOS News [Online], 9(9). Retrieved October 1, 1999 from the WWW.

Hara, N., & Kling, R. (1999). Students' frustrations with a web-based distance education course: A taboo topic in the discourse [Online]. Retrieved September 26, 1999 from the WWW. Available: http://www.slis.indiana.edu/CSI/wp99_01.html

Hartman, V. F. (1995). Teaching and learning style preferences: Transitions through technology. VCCA Journal, 9(2), 18-20.

Horton, S., & Lynch, P. J. (November/December, 1997). Web multimedia: Turning the corner. Syllabus, 11(4), 16-20.

Hruska-Riechmann, S., & Grasha, A. F. (1982). The Grasha-Riechmann student learning style scales. In J. Keefe (Ed.), Student learning styles and brain behavior (pp. 81-86). Reston, VA: National Association of Secondary School Principals.

International Data Corporation. (1999, February). Online Distance Learning in Higher Education, 1998-2002 [Online]. Available October 15, 1999: <http://www.idc.com/Data/Consumer/content/CSB020999PR.htm>

James, W. B., & Blank, W. E. Review and critique of available learning-style instruments for adults. In D. D. Flannery (Ed.), New directions for adult and continuing education, No. 59, Applying cognitive learning theory to adult learning (pp. 47-57). San Francisco, CA: Jossey-Bass.

James, W. B., & Gardner, D. L. (1995). Learning styles: Implications for distance learning. (ERIC Document Reproduction Service No. EJ 514 356)

Jonassen, D. H., Davidson, M., Collins, M., Campbell, J., & Haag, B. (1995). Constructivism and computer-mediated communication in distance education. American Journal of Distance Education. (9)2, 7-26.

Jonassen, D. H., & Reeves, T. C. (1996). Learning with technology: Using computers as cognitive tools. In D. H. Jonassen (Ed.), Handbook of research for educational

communications and technology (pp. 693-719). New York, NY: Simon & Schuster Macmillan.

Kaplan, H. (1997). Interactive multimedia & the world wide web. Educom Review [Online]. Available: <http://www.educom.edu/web/pubs/review/reviewArticles/32148.html>

Kemp, J. E., Morrison, G. R., & Ross, S. M. (1998). Designing effective instruction (2nd ed.). Upper Saddle River, NJ.

Kerka, S. (1996). Distance learning, the internet, and the world wide web. (ERIC Document Reproduction Service No. ED 395 214)

Kilian, C. (1997). F2F: Why teach online. Educom Review [Online]. Available: <http://www.educom.edu/web/pubs/review/reviewArticles/32431.html>

Klesius, J., Homan, S., & Thompson, T. (1997). Distance education compared to traditional instruction: The students' view. International Journal of Instructional Media, 24(3), 207-220.

Kolb, D. A. (1986). Learning style inventory: Technical manual (Rev. ed.). Boston, MA: McBer.

Lacina-Gifford, L. J., & Kher-Durlabhji, N. (1996, Summer). Preparing to teach a class by internet. College Teaching, 44, 94-95.

Luk, S. C. (1998, April). The relationship between cognitive style and academic achievement. British Journal of Educational Technology, 29(2), 137-147.

Matthews, D. (1998, September/October). Transforming higher education: Implications for state higher education finance policy. Educom Review [On-line]. Available March 18, 1999: <http://www.educause.edu/ir/library/html/erm9854.html>

McKeachie, W. J. (1994). Teaching tips: Strategies, research, and theory for college and university teachers. Lexington, MA: D.C. Heath and Company.

McCullum K. (1998, May 15). Accreditors are urged to prepare to evaluate distance learning. The Chronicle of Higher Education [On-line]. Available: <http://chronicle.com>

Mendels, P. (1999, September). Study finds problems with web class. The New York Times on the Web, pp. B10 [Newspaper,

selected stories online]. Retrieved September 26, 1999 from the World Wide Web. Available:
<http://www.nytimes.com/library/tech/99/09/cyber/education/22education.html>

Merrill, M. D. (1997). Instructional strategies that teach. CBT Solutions [Online]. Available:
http://www.cbtsolutions.com/cbtsolutions/html/m_onli.htm

Miller, S. M., & Miller, K. L. (1999). Using instructional theory to facilitate communication in web-based courses. Educational Technology & Society 2(3), 106-114.

Moore, M. G., & Thompson, M. M. (1990). The effects of distance learning: A summary of literature. (ERIC Document Reproduction Service No. ED 330 321)

Moore, M. G., & Thompson M. M. (1997). The effects of distance learning (Rev. ed. ACSDE Research Monograph No. 15). University Park, PA: American Center for the Study of Distance Education, The Pennsylvania State University.

Muzio, J. A. (1999). The development and evaluation of a prototype learner-centered electronic distributed learning course for Royal Roads University. Unpublished doctoral dissertation, Nova Southeastern University, Fort Lauderdale, FL.

Naidu, S. (1997). Collaborative reflective practice: An instructional design architecture for the internet. Distance Education, 18(2), 257-283.

National Education Association. (1998, February). Distance education in higher education institutions (Update, volume 4). Washington, DC: Office of Higher Education.

Olgren, C. H. (1998). Improving learning outcomes: The effects of learning strategies and motivation. In C. Gibson (Ed.) Distance learners in higher education: Institutional responses for quality outcomes (pp. 77-95). Madison, WI: Atwood.

Parker, A. (1999, December). A study of variables that predict dropout from distance education. International Journal of Educational Technology [On-line serial], 1(2). Retrieved December 16, 1999 from the WWW. Available:
<http://www.outreach.uiuc.edu/ijet/v1n2/parker/index.html>

Patton, M. Q. (1990). Qualitative evaluation and research methods (2nd ed.). Newbury Park, CA: Sage.

Phipps, R., & Merisotis, J. (1999). What's the difference?: A review of contemporary research on the effectiveness of distance learning in higher education. Washington, DC: The Institute for Higher Education Policy.

Price, G. E., Dunn, R., & Dunn, R. (1991). Productivity environmental preference survey. PEPS manual. Lawrence, KS: Price Systems, Inc. Box 1818.

Richards, C. N., & Ridley, D. R. (1997). Factors affecting college student's persistence in on-line computer-managed instruction. College Student Journal, 31, 490-495.

Ridley, D. R. (1996). Assessment plan for CNU online (1996 Rev. ed.). (ERIC Document Reproduction Service No. ED 401 313)

Ridley, D. R., & Sammour, H. Y. (1996). Viable alternative means of instructional delivery: Online courses as an alternative teaching method. College Student Journal, 30, 337-339.

Ridley, D. R., Bailey, B. L., Davies, E. S., & Hash, S. G. (1997). Evaluating the impact of online course enrollments on FTEs at an urban university. (ERIC Document Reproduction Service No. ED 410 871)

Riechmann, S. W., & Grasha, A. F. (1974). A rational approach to developing and assessing the construct validity of a student learning style scales instrument. The Journal of Psychology, 87, pp. 213-223.

Rosen, L. (1998). The world wide web: Taking on the pedagogical challenge [On-line]. Available: http://sunsite.unc.edu/horizon/mono/CD/instructional_Technology/Rosen.html

Ross, J. L., & Schulz, R. A. (1999). Using the world wide web to accommodate diverse learning styles. College Teaching 47(4), 123-129.

Rossi, P. H., & Freeman, H. E. (1993). Evaluation: A systematic approach (5th ed.). Newbury Park, CA: Sage.

Saba, F. (1998a). Is distance education comparable to "traditional" education? Distance Education Report, sample issue, p. 3.

Saba, F. (1998b). The year ahead: Will distance education enter the mainstream? Distance Education Report, sample issue, pp. 1-2.

Sarasin, L. C. (1998). Learning style perspectives: Impact in the classroom. Madison, WI: Atwood.

Schutte, J. G. (1998). Virtual teaching in higher education [On-line]. Available: <http://www.csun.edu/sociology/virexp.htm>

Schuyler, G. (1997). A Paradigm shift from instruction to learning. ERIC Digests [Online], Available: <http://www.gseis.ucla.edu/ERIC/digests/dig9802.html>

Sherron, G. T. (1998). Distance learning: Supporting strategies. Paper presented at the College and University Computer Users Association conference.

Simonson, M. (1997). Distance education: Does anyone really want to learn at a distance? (1997, Winter). Contemporary Education, 68, 104-107.

Thompson, M. M. (1998). Distance learners in higher education. In C. Gibson (Ed.), Distance learners in higher education: Institutional responses for quality outcomes (pp. 9-24). Madison, WI: Atwood.

Vishwanatham, R., Wilkins, W., & Jevic, T. (1997, September). The internet as a medium for online instruction. College & Research Libraries, pp. 433-444.

Wilson, C. (1998). Concerns of instructors delivering distance learning via the WWW. Online Journal of Distance Learning Administration [Online]. Retrieved March 17, 1999 from the WWW. Available: <http://www.westga.edu:80/~distance/wilson13.html>

Witkin, H. A. (1976). Cognitive style in academic performance and in teacher-student relations. In S. Messick (Ed.), Individuality in learning (pp. 38-72). San Francisco, CA: Jossey-Bass.

Wratcher, M. A., Morrison, E. E., Riley, V. L., & Scheirton, L. S. (1997). Curriculum and program planning: A study guide for the core seminar. Programs for higher education: Nova Southeastern University.

Wolverton, G. R. (1999, January 30). At home in school. San Jose Mercury News [Online]. Available: <http://www.mercurycenter.com/local/education/docs/online013199.htm>

APPENDIXES

Appendix A

Student Survey Cover Letter

Dear Student,

As you are probably aware, distance education via the world wide web is a relatively new method of instructional delivery. Since the format of delivering distance courses differs from more traditional courses, we would like to collect some information on the effectiveness of the distance course as compared to the traditional course setting so that we might be able to design courses in the future that will best benefit student needs.

You are being asked to participate, either as part of the experimental (distance) or comparison (traditional) group, in a study entitled: "Comparison of student characteristics, and evaluation of student success, in an online health education class." We will be accessing your student records through the college's mainframe computer system in order to collect grade records and other information.

It is important to note that any information you provide will remain anonymous and confidential. Any data published by this study will be published only with reference to groups (aggregate) and not individuals. As a participant, it is your decision to be a part of this study, and you may remove yourself from the research process at any time without negative consequence to your grade or class status.

If you have any questions or problems responding to this survey, please feel free to call, Fax, or E-mail me.

David P. Diaz Cuesta College P.O. Box 8106 San Luis Obispo, CA 93403-8106	Office phone: (805) 546-3215 Fax: (805) 546-3299 E-mail: ddiaz@bass.cuesta.cc.ca.us
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Appendix B
Online, All-Health and All-Campus Demographics

Ethnicity	Distance		All-Health		All-Campus	
	<u>n</u>	%	<u>n</u>	%	<u>n</u>	%
White	78	81.3	445	76.1	6967	76.1
Asian	3	3.1	17	2.9	306	3.3
Black	2	2.1	13	2.2	169	1.8
Hispanic	7	7.3	66	11.3	1133	12.4
Filipino	1	1.0	8	1.4	125	1.4
Amer. Ind.	1	1.0	11	1.9	120	1.3
Other/Undecla	4	4.2	25	4.3	336	3.7
Total	96	100.0	585	100.0	9156	100.0

Gender	Distance		All-Health		All-Campus	
	<u>n</u>	%	<u>n</u>	%	<u>n</u>	%
Female	53	55.2	315	53.9	4850	53.3
Male	43	44.8	269	46.1	4249	46.7
Total	96	100.0	584	100.0	9099	100.0

Course Load	Distance		All-Health		All-Campus	
	<u>n</u>	%	<u>n</u>	%	<u>n</u>	%
6 or fewer	30	31.3	113	19.3	2946	32.2
6.1-11.9	30	31.3	154	26.3	2190	23.9
12-15 units	27	28.1	275	47.0	3533	38.6
More than 15	9	9.4	43	7.4	487	5.3

Course Load	Distance		All-Health		All-Campus	
	<u>n</u>	%	<u>n</u>	%	<u>n</u>	%
Total	96	100.0	585	100.0	9156	100.0

Student Level	Distance		All-Health		All-Campus	
	<u>n</u>	%	<u>n</u>	%	<u>n</u>	%
Fewer than 30	32	33.3	405	69.2	6162	67.3
30-59.9 units	22	22.9	117	20.0	1559	17.0
60 or more	35	36.5	50	8.5	429	4.7
AA/AS Degree	1	1.0	6	1.0	645	7.0
BA/BS Degree	6	6.3	7	1.2	361	3.9
Total	96	100.0	585	100.0	9156	100.0

Age	Distance		All-Health		All-Campus	
	<u>n</u>	%	<u>n</u>	%	<u>n</u>	%
17 and under	1	1.0	40	6.8	436	4.8
18 only	2	2.1	140	23.9	1246	13.6
19 only	11	11.5	112	19.1	1365	14.9
20-21	23	24.0	140	23.9	1903	20.8
22-25	22	22.9	84	14.4	1408	15.4
26-30	13	13.5	26	4.4	778	8.5
31-40	12	12.5	26	4.4	1007	11.0
41-50	12	12.5	13	2.2	682	7.4
51-65	0	0.0	1	0.2	267	2.9
Over 65	0	0.0	2	0.3	59	0.6
Undeclared	0	0.0	1	0.2	5	0.1
Total	96	100.0	585	100.0	9156	100.0

Appendix C

Distance Education Questionnaire**Distance Education Questionnaire**

Fill in the appropriate bubble on this Scantron Survey. If questions do not apply, leave them blank.

Name: _____ SS# _____

Computer Characteristics

1. If you were to use a computer to access the Worldwide Web, whose would you use? (Mark only one)

My Own Cuesta Library/ASCC Lab
 Friend's or Family's Other

2. What operating system does the computer have that you will be using most often for this class?

Macintosh Windows 95
 Windows 3.1 Other

3. What type and how fast is the Central Processing Unit (CPU) on the computer you will be using for this class?

030 or 040 Macintosh DOS 386/486 Pentium Pro
 Power Mac (Power PC) Pentium Other (specify) _____

Write out the processor speed in megahertz (e.g. 100 MHz) _____

4. How much Random Access Memory (RAM) does the computer you will be using have? (e.g. 16 MB) _____

Electronic Communication Experience

5. How would you rate your world wide web expertise?

Poor Adequate Very Good
 Fair Good

6. How would you rate your electronic mail ("e-mail") expertise?

Poor Adequate Very Good
 Fair Good

Web Access

7. If you will be using a modem to connect to the world-wide web, give the speed of the modem in bps.

9.6 (9600) 28.8 (28000) 56 K
 14.4 (14400) 33.6 (33600) Not Applicable

8. If you will be using a higher speed connection, please indicate what type:

ISDN Other
 Campus 10 Base-T Not Applicable

9. Where do you expect to be gaining access to the world wide web most of the time?
- Home Cuesta Campus network
- Work Other (specify)_____
10. If accessing the world wide web through an Internet Service Provider (ISP), please indicate which one:
- America Online The Grid Other (specify)_____
- Prodigy SLO Net
11. How convenient is it for you to attend this class?
- Not Convenient At All No Opinion Very Convenient
- Inconvenient Convenient
12. Overall, how motivated are you to do well in this course?
- Not at all Motivated No Opinion Very Motivated
- Fairly Unmotivated Motivated
13. In terms of student learning, how important do you think it is for the student and teacher to be in the same room?
- Very Unimportant Neutral Very Important
- Unimportant Important
14. If you had a choice, what format would you prefer for this course?
- Strongly Prefer Traditional Strongly Prefer Distance Doesn't Matter/No Opinion
- Prefer Traditional Prefer Distance
15. Household Income (1996 Gross household income)
- \$0-\$20,000 \$40,001-\$60,000 Over \$80,000
- \$20,001-\$40,000 \$60,001-\$80,000
16. Learning Styles *[This space for administrative use only]* Grasha-Reichmann Student Learning Style
- Competitive Avoidance Dependent
- Collaborative Participant Independent

Appendix D

Grasha-Riechmann Student Learning Style Scales**Grasha-Riechmann
Student Learning Style Scales**

General Class Form (Version 4.3)

The following questionnaire has been designed to help you clarify your attitudes and feelings toward the courses you have taken thus far in college. There are no right or wrong answers to each question. However, to answer each question, form your answers with regard to your general attitudes and feelings toward all of your courses.

Respond to the items listed below using the following rating scale. Follow the instructions of the person administering the questionnaire and put your answers either on a separate sheet of paper or on a computer scored answer sheet that is provided.

- Use a rating of 1 if you *strongly disagree* with the statement.
 Use a rating of 2 if you *moderately disagree* with the statement.
 Use a rating of 3 if you are *undecided*.
 Use a rating of 4 if you *moderately agree* with the statement.
 Use a rating of 5 if you *strongly agree* with the statement.

01. I prefer to work by myself on assignments in my courses.
02. I often daydream during class.
03. Working with other students on class activities is something I enjoy doing.
04. I want teachers to do exactly what they expect of us, students.
05. To do well, it is necessary to compete with other students for the teacher's attention.
06. I do whatever is asked of me to learn the content in my classes.
07. My ideas about the content often are as good as those in the textbook.
08. Classroom activities are usually boring.
09. I enjoy discussing my ideas about course content with other students.
10. I rely on my teachers to tell me what is important for me to learn.
11. It is necessary to compete with other students to get a good grade.
12. Class sessions typically are worth attending.
13. I study what is important to me and not always what the instructor says is important.
14. I very seldom am excited about material covered in a course.
15. I enjoy hearing what other students think about issues raised in class.
16. I want clear and detailed instructions on how to complete assignments.
17. In class, I must compete with other students to get my voice across.
18. I get more out of going to class than staying at home.
19. I learn a lot of the course in my classes on my own.
20. I don't want to attend most of my classes.
21. Students should be encouraged to share more of their ideas with each other.
22. I complete assignments exactly the way my teachers tell me to do them.
23. Students have to be aggressive to do well in courses.
24. It is my responsibility to get as much as I can out of a course.
25. I feel very confident about my ability to learn on my own.
26. Paying attention during class sessions is difficult for me to do.

Rating Scale

- Use a rating of 1 if you *strongly disagree* with the statement.
 Use a rating of 2 if you *moderately disagree* with the statement.
 Use a rating of 3 if you are *undecided*.
 Use a rating of 4 if you *moderately agree* with the statement.
 Use a rating of 5 if you *strongly agree* with the statement.
-

27. I like to study for tests with other students.
 28. Trying to decide what to study or how to do assignments makes me uncomfortable.
 29. I like to solve problems or answer questions before anybody else can.
 30. Classroom activities are interesting.
 31. I like to develop my own ideas about course content.
 32. I have given up trying to learn anything from going to class.
 33. Class sessions make me feel like part of a team where people help each other learn.
 34. Students should be more closely supervised by teachers on course projects.
 35. To get ahead in class, it is necessary to step on the toes of other students.
 36. I try to participate as much as I can in all aspects of a course.
 37. I have my own ideas about how classes should be run.
 38. I study just hard enough to get by.
 39. An important part of taking courses is learning to get along with other people.
 40. My notes contain almost everything the teacher said in class.
 41. Being one of the best students in my classes is very important to me.
 42. I do all course assignments well whether or not I think they are interesting.
 43. If I like a topic, I try to find out more about it on my own.
 44. I typically cram for exams.
 45. Learning the material was a cooperative effort between students and teachers.
 46. I prefer class sessions that are highly organized.
 47. To stand out in my classes, I complete assignments better than other students.
 48. I typically complete course assignments before their deadlines.
 49. I prefer to work on class projects and assignments by myself.
 50. I would prefer that teachers ignore me in class.
 51. I am willing to help other students out when they do not understand something.
 52. Students should be told exactly what material is to be covered on exams.
 53. I like to know how well other students are doing on exams and course assignments.
 54. I complete required assignments as well as those that are optional.
 55. When I don't understand something, I first try to figure it out for myself.
 56. During class sessions, I tend to socialize with people sitting next to me.
 57. I enjoy participating in small group activities during class.
 58. I want teachers to have opinions or notes on the board.
 59. I want my teachers to give me more recognition for the good work I do.
 60. In my classes, I often sit toward the front of the room.
-

Appendix F

Distance Education Questionnaire Results

COMPUTER CHARACTERISTICS						
QUESTIONS		Distance Group		Control Group		RESPONSES
No.	Description	N	%	N	%	
1.	If you were to use a computer to access the worldwide web, whose would you use?	73	78.5	44	37.6	<i>My own</i>
		19	20.4	39	33.3	<i>Friend's or Family's</i>
		1	1.1	32	27.4	<i>Cuesta Library/ASCC Lab</i>
		0	0.0	1	0.9	<i>Other</i>
		0	0.0	1	0.9	<i>Omit</i>
		93	100.0	117	100.0	TOTAL
2.	What operating system does the computer have that you will be using most often in this class?	7	7.5	9	7.7	<i>Macintosh</i>
		7	7.5	5	4.3	<i>Windows 3.1</i>
		63	67.7	79	67.5	<i>Windows 95</i>
		14	15.1	11	9.4	<i>Other</i>
		2	2.2	13	11.1	<i>Omit</i>
		93	100.0	117	100.0	TOTAL
3.	What type and how fast is the Central Processing Unit (CPU) on the computer you will be using for this class?	1	1.1	3	2.6	<i>030 or 040 Macintosh</i>
		5	5.4	5	4.3	<i>Power Mac (Power PC)</i>
		11	11.8	5	4.3	<i>DOS 386/486</i>
		41	44.1	34	29.1	<i>Pentium</i>
		13	14.0	7	6.0	<i>Pentium Pro</i>
		3	3.2	3	2.6	<i>Other</i>
		19	20.4	60	51.3	<i>Omit</i>
93	100.0	117	100.0	TOTAL		
4.	How much Random Access Memory (RAM) does the computer you will be using for this class have?	1	1.1	3	2.6	<i>8 MB</i>
		18	19.4	7	6.0	<i>16 MB</i>
		16	17.2	6	5.1	<i>32 MB</i>
		1	1.1	1	0.9	<i>48 MB</i>
		3	3.2	3	2.6	<i>64 MB</i>
		6	6.5	6	5.1	<i>Other</i>
		48	51.6	91	77.8	<i>Omit</i>
		93	100.0	117	100.0	TOTAL
5.	How would you rate your world wide web expertise?	5	5.4	22	18.8	<i>Poor</i>
		15	16.1	29	24.8	<i>Fair</i>
		26	28.0	36	30.8	<i>Adequate</i>
		28	30.1	19	16.2	<i>Good</i>
		19	20.4	8	6.8	<i>Very Good</i>
		0	0.0	3	2.6	<i>Omit</i>
		93	100.0	117	100.0	TOTAL
6.	How would you rate your electronic mail ("e-mail") expertise?	9	9.7	41	35.0	<i>Poor</i>
		15	16.1	19	16.2	<i>Fair</i>
		24	25.8	25	21.4	<i>Adequate</i>
		25	26.9	11	9.4	<i>Good</i>
		20	21.5	16	13.7	<i>Very Good</i>
		0	0.0	5	4.3	<i>Omit</i>
		93	100.0	117	100.0	TOTAL

7. If you will be using a modem to connect to the world wide web, give the speed of the modem in bps.	0	0.0	0	0.0	9.6 (9600)
	9	9.7	7	6.0	14.4 (14400)
	13	14.0	15	12.8	28.8 (28000)
	10	10.8	10	8.5	33.6 (33600)
	30	32.3	15	12.8	56K
	5	5.4	10	8.5	Not Applicable
	26	28.0	60	51.3	Omit
	93	72.0	117	100.0	TOTAL
8. If you will be using a higher speed connection, please indicate what type:	4	4.3	2	1.7	ISDN
	1	1.1	14	12.0	Campus 10 Base-T
	2	2.2	4	3.4	Other
	45	48.4	33	28.2	Not Applicable
	41	44.1	64	54.7	Omit
	93	100.0	117	100.0	TOTAL
9. Where do you expect to be gaining access to the world wide web most of the time?	86	92.5	69	59.0	Home
	1	1.1	0	0.0	Work
	2	2.2	33	28.2	Cuesta Campus Network
	3	3.2	13	11.1	Other (specify)
	1	1.1	2	1.7	Omit
	93	100.0	117	100.0	TOTAL
10. If accessing the world wide web through an Internet Service Provider (ISP), please indicate which one:	32	34.4	42	35.9	America Online
	0	0.0	2	1.7	Prodigy
	26	28.0	16	13.7	The Grid
	5	5.4	6	5.1	SLO Net
	25	26.9	18	15.4	Other
	5	5.4	33	28.2	Omit
		93	100.0	117	100.0
11. How convenient is it for you to attend this class?	5	5.4	1	0.9	Not convenient at all
	10	10.8	10	8.5	Inconvenient
	9	9.7	17	14.5	No opinion
	36	38.7	57	48.7	Convenient
	31	33.3	31	26.5	Very convenient
	2	2.2	1	0.9	Omit
	93	100.0	117	100.0	TOTAL
12. Overall, how motivated are you to do well in this course?	1	1.1	0	0.0	Not at all motivated
	0	0.0	8	6.8	Fairly unmotivated
	5	5.4	12	10.3	No opinion
	38	40.9	61	52.1	Motivated
	48	51.6	34	29.1	Very motivated
	1	1.1	2	1.7	Omit
	93	100.0	117	100.0	TOTAL
13. In terms of student learning, how important do you think it is for the student and teacher to be in the same room?	1	1.1	6	5.1	Very unimportant
	15	16.1	4	3.4	Unimportant
	57	61.3	37	31.6	Neutral
	17	18.3	41	35.0	Important
	2	2.2	28	23.9	Very important
	1	1.1	1	0.9	Omit
	93	100.0	117	100.0	TOTAL

14. If you had a choice, what format would you prefer for this course?	1	1.1	26	22.2	<i>Strongly prefer traditional</i>
	7	7.5	46	39.3	<i>Prefer traditional</i>
	21	22.6	1	0.9	<i>Strongly prefer distance</i>
	43	46.2	8	6.8	<i>Prefer distance</i>
	20	21.5	34	29.1	<i>Doesn't matter/No opinion</i>
	1	1.1	2	1.7	<i>Omit</i>
	93	100.0	117	100.0	TOTAL
15. Household Income (1996/1997 Gross household income)	38	40.9	42	35.9	<i>\$0-\$20,000</i>
	13	14.0	16	13.7	<i>\$20,000-\$40,000</i>
	11	11.8	12	10.3	<i>\$40,001-\$60,000</i>
	10	10.8	5	4.3	<i>\$60,001-\$80,000</i>
	11	11.8	16	13.7	<i>Over \$80,000</i>
	10	10.8	26	22.2	<i>Omit</i>
	93	100.0	117	100.0	TOTAL

Appendix G
Categorical Data

	AS		ANS	
	<u>n</u>	%	<u>n</u>	%
Educational Goal				
Educational Dev.	1	1.3	2	9.5
AA/AS and Transfer	32	4.7	9	42.9
Transfer only	15	20.0	4	19.0
AA/AS Degree only	8	10.7	3	14.3
Vocational AA/AS only	5	6.7	-	-
Vocational Certificate	1	1.3	-	-
Discover new Career	1	1.3	1	4.8
Prepare for Career	3	4.0	1	4.8
Job Advancement	1	1.3	1	4.8
License/Degree	2	2.7	-	-
Undecided on goal	6	8.0	-	-
Total	75	100.0	21	100.0
Gender				
Male	30	40.0	13	61.9
Female	45	60.0	8	38.1
Total	75	100.0	21	100.0
Enroll Status				
First Time Student	7	9.3	1	4.8
First Time Transfer	4	5.3	-	-
Returning Transfer	4	5.3	1	4.8
Returning Student	4	5.3	1	4.8
Continuing Student	56	74.7	18	85.7

Ethnicity	AS		ANS	
	<u>n</u>	%	<u>n</u>	%
White	59	78.7	19	90.5
Asian	2	2.7	1	4.8
Hispanic	7	9.3	-	-
Filipino	1	0.1	-	-
Black	2	2.7	-	-
Other/Undeclared	4	5.3	-	-
Total	75	100.0	21	100.0
Income Level				
\$0 - \$20,000	29	46.8	9	42.9
\$20,001 - \$40,000	8	12.9	5	23.8
\$40,001 - \$60,000	8	12.9	3	14.3
\$61,000 - \$80,000	10	16.1	-	-
Greater than \$80,000	7	11.3	4	19.0
Total	62	100.0	21	100.0

Appendix H
Continuous Data

Variables	Groups					
	Successful			Non-Successful		
	<u>n</u>	<u>M</u>	<u>SD</u>	<u>n</u>	<u>M</u>	<u>SD</u>
Prior college GPA	75	3.02	0.66	21	2.25	0.95
Prior college units	75	36.05	29.09	21	37.40	36.30
No. of Dependents	42	0.62	0.99	13	0.46	0.97
Hours work	62	22.69	15.88	17	20.47	14.16
Units attempted	75	9.65	4.85	21	6.64	5.10
WWW expertise	72	3.38	1.07	21	3.67	1.39
E-mail expertise	72	3.26	1.27	21	3.62	1.20
Motivation	71	4.44	0.73	21	4.43	0.60
Age	75	26.81	8.05	21	26.00	9.99

Appendix I

Test Raw Scores

CODE	PIN#	T#1	T#2	T#3	T#4	TOTAL	GRADE
327	4121	61	62	59	50	232	C
327	3872	68	58	67	63	256	B
327	8496	67	67	71	69	274	A
327	2412	64	59	64	48	235	C
327	0953	58	47	60	41	206	C
327	5611	49	36			85	F
327	4222	51	42	60	52	205	D
327	7194	56	53	59	38	206	C
327	2353	56	51	66	51	224	C
327	2456	47	38	59	54	198	C
327	8409	68	64	68	69	269	A
327	8157	61	67	66	66	260	B
327	9620	62	54	63	59	238	B
327	8591	68	66	64	63	261	B
327	4324	56	53	65	64	238	C
327	5081	47	51	61	58	217	C
327	8348	57	65	70	71	263	A
327	8952	47	46	57	43	193	C
327	1119	64	55	66	67	252	B
327	4694	63	64	66	64	257	B
327	7834	66	65	67	67	265	C
327	2328	69	68	67	46	250	B
327	2868	71	70	69	66	276	B
327	6169	69	62	68	70	269	A

CODE	PIN#	T#1	T#2	T#3	T#4	TOTAL	GRADE
327	7367	66	65	65	64	260	B
327	3977	69	61	63	60	253	B
327	9305	70	63	65	63	261	A
327	2487	67	69	67	72	275	A
327	3330	56	44	43	44	187	F
327	8327	69	69	68	69	275	A
327	0709	68	58	62	54	242	F
327	5565	67	68	72	73	280	A
327	0710	64	56	67	67	254	B
327	7104	52	50	62	56	220	C
4311	9609	64	63	61	63	251	B
4311	5581	71	66	69	68	274	A
4311	8784	60	43	63	57	223	C
4311	4279	51	49	56	40	196	C
4311	9457	62	68	65	67	262	B
4311	0075	53	45	58	46	202	D
4311	0749	60	55	67	67	249	C
4311	0840	61	59	69	62	251	B
4311	3336	69	61	65	56	251	C
4311	1057	64	55	66	53	238	B
4311	5713	70	70	69	72	281	A
4311	7762	69	66	63	68	266	A
4311	7200	66	65	69	57	257	B
4311	3864	67	72	67	68	274	A
4311	2443	53	59	55	57	224	B
4311	8812	69	62	67	68	266	A

CODE	PIN#	T#1	T#2	T#3	T#4	TOTAL	GRADE
4311	9424	61	62	68	71	262	A
4311	1896	70	68	67	70	275	A
4311	6274	66	67	64	65	262	A
4311	7010	56	40	53	62	211	C
4311	8586	67	68	64	59	258	B
4311	9589	69	69	69	73	280	B
4311	1365	53	48	54	34	189	C
4311	7771	66	67	67	69	269	B
4368	6553	66	62	66	65	259	B
4368	6957	60	64	66	69	259	B
4368	2044	55	63	63	48	229	B
4368	9309	66	66	67	66	265	B
4368	3925	67	61	70	65	263	B
4368	1346	67	63	54	55	239	B
4368	1623	70	63	67	55	255	C
4368	4656	59	53	67	54	233	C
4368	5680	66	61	67	39	233	B
4368	2536	54	45	54	60	213	C
4368	7197	57	42	47	36	182	C
4368	7905	61	67	68	72	268	A
4368	6956	62	61	65	63	251	B
4368	9731	64	68	70	68	270	A
4368	8833	68	61			129	F
4368	4078	70	70	69	69	278	A
4368	1101	64	64	67	58	253	B
4368	7330	60	60	66	51	237	C

CODE	PIN#	T#1	T#2	T#3	T#4	TOTAL	GRADE
4368	0849	67	67	66	72	272	A
4368	6705	65	63	69	63	260	B
4368	0253	56	57	63	64	240	B
4368	6946	63	67	63	70	263	A
4368	0293	71	71	71	70	283	A
4368	9931	68	63	66	68	265	A

ON-CAMPUS

GRADES

CODE	PIN#	T#1	T#2	T#3	T#4	TOTAL	GRADE
4315	6375	48	39	48	48	183	D
4315	9905	65	54		70	189	D
4315	9779	55	56	66	54	231	B
4315	5938	53	57	70	56	236	C
4315	9620	55	64	65	62	246	B
4315	8740	62	54	63	56	235	B
4315	6624	63	52	55	63	233	B
4315	7716	69	66	71	69	275	A
4315	4858	54	58	60	53	225	B
4315	0248	71	72	72	71	286	A
4315	4331	45	42	52	46	185	D
4315	9887	55	46	55	54	210	C
4315	2391	54	64	68	58	244	B
4315	2962	61	61	72	38	232	C
4315	5103	65	62	68	71	266	A
4315	2011	64	57	69	49	239	B

CODE	PIN#	T#1	T#2	T#3	T#4	TOTAL	GRADE
4315	1984	53	60	60	62	235	B
4315	7261	57	63	67	58	245	B
4315	7473	66	70	71	74	281	A
4315	1139	71	69	69	73	282	A
4315	7381	66	69	71	69	275	A
4315	4223	61	50	65	47	223	B
4315	3028	57	32	54	47	190	D
4315	1956	54	48	57	46	205	C
4315	7794	53	53	59	44	209	C
4315	8947	62	64	69	65	260	B
4315	3416	61	44	60	65	230	B
4315	1408	61	59	68	62	250	B
4315	4229	55	48	64	48	215	C
4315	7330	58	60	61		179	D
4315	4959	66	65	71	69	271	A
4315	1576	53	57	68	68	246	B
4315	1065	62	69	69	65	265	B
4315	8960	69	49	62	72	252	B
4315	6949	61	61	72	61	255	B
4315	5665	65	58	67	63	253	B
4315	5527	63	40	62	52	217	C
4315	1226	56	54	64	44	218	C
4316	5885	43	42	52	35	172	D
4316	9226	55	35	53	53	196	D
4316	5922	55	43	56	40	194	C
4316	7208	43	45	58	39	185	D

CODE	PIN#	T#1	T#2	T#3	T#4	TOTAL	GRADE
4316	4192	59	44	58	47	208	C
4316	8937	61	71	68	68	268	A
4316	8873	61	53	68	68	250	A
4316	5032	62	63	71	62	258	B
4316	6767	54	64	65	48	231	B
4316	6090	38	41	46	21	146	F
4316	4223	45	49	48	29	171	D
4316	1657	60	66	65	63	254	B
4316	6147	66	63	71	53	253	B
4316	7857	52	51	68	47	218	B
4316	0886	55	62	67	65	249	B
4316	3801	59	58	54	50	221	B
4316	9279	68	72	71	68	279	A
4316	5658	72	65	60	55	252	B
4316	9009	58	57	56	57	228	C
4316	2161	51	58	63	45	217	C
4316	9484	60	63	65	57	245	A
4316	3026	63	65	73	70	271	A
4316	6796	59	58	63	54	234	B
4316	8290	62	66	66	66	260	B
4316	1023	62	46	63		171	F
4316	5822	57	61	61		179	D
4316	6224	61	60	67	71	259	B
4316	7286	68	49	69	69	255	A
4316	5649	45	51	66	55	217	C
4316	7339	58	59	59	53	229	B

CODE	PIN#	T#1	T#2	T#3	T#4	TOTAL	GRADE
4316	8252	59	55	69	59	242	B
4316	9202	60	46	57	47	210	C
4316	7114	56	44	50	51	201	C
4316	2641	60	54	67	60	241	B
4316	3508	60	56	59	51	226	B
4316	6685	68	53			121	F
4316	0921	55	43	53	47	198	D
4316	4574	57		69	69	195	D
4316	9873	46	47	58		151	F
4316	2025	56	57	64	52	229	C
4316	1882	0				0	W
4316	4453	59	54	58	61	232	B
4316	7730	38	36	49	38	161	D
4316	8542	41	47	51		139	F
4316	6727	62	65	67	70	264	B
4318	6263	54		60		114	F
4318	9975	47				47	F
4318	2983	50				50	F
4318	5924	61	68	70	68	267	A
4318	4640	41	40	54	40	175	D
4318	6674	64	64	70	70	268	A
4318	3535	57	54	65	53	229	C
4318	2895	63	60	66	68	257	B
4318	7218	55	52	60	47	214	C
4318	2903	61	61	67	64	253	B
4318	0263	58	68	67	61	254	B

CODE	PIN#	T#1	T#2	T#3	T#4	TOTAL	GRADE
4318	6981	63	62	70	51	246	B
4318	6569	60	61	68	43	232	C
4318	8867	0				0	W
4318	5548	58	53	60	54	225	B
4318	7517	63	55	65	63	246	B
4318	6712	42	51	64	46	203	C
4318	8395	0				0	W
4318	8283	50	47	62		159	F
4318	5808	59	68	68	63	258	B
4318	9470	64	57	52	57	230	C
4318	2027	41	58	56		155	F
4318	6197	68	60	63	72	263	B
4318	3616	51	62	70	62	245	B
4318	5641	65	67	61	65	258	A
4318	2552	62	55	71	65	253	B
4318	8945	59	56	65	65	245	B
4318	1830	65	62	60	47	234	B
4318	0045	51	66	61	68	246	A
4318	5388	59	62	58	60	239	B
4318	4350	46	55	66	42	209	C
4318	6408	63	58	63	60	244	C
4318	8422	64	56	64	56	240	B
4318	8194	64	50	54	44	212	C
4318	8110	63	58	70	65	256	B
4318	2954	60				60	F
4318	1447	50	34	45		129	F

CODE	PIN#	T#1	T#2	T#3	T#4	TOTAL	GRADE
4318	6914	57	63	67	68	255	B
4318	8946	56	62	68	47	233	C
4318	3512	61	61	64	53	239	C
4318	0022	55	50	53	55	213	C
4318	0153	51	44	58	34	187	D
4318	4423	59	44	63	48	214	C
4318	1995	54	41	66	63	224	C
4318	4644	61	56	68	63	248	B
4318	5044	61	67	64	63	255	B
4318	5055	51	43	48	45	187	D
4318	2113	46	45	58	52	201	F
4318	0909	60	44	64	55	223	C

BIOGRAPHICAL SKETCH OF DAVID P. DIAZ

David P. Diaz is an instructor in the Health and Physical Education division at Cuesta Community College in San Luis Obispo, California. He holds a bachelor's degree in Physical Education, and a Master's degree in Wellness Management from California Polytechnic State University in San Luis Obispo, California.

Mr. Diaz has taught for 21 years in higher education and, during this time, has served on many statewide technology committees including the California State Chancellor's Office "Telecommunications Technology Advisory Committee," "TTIP," and "@ONE project" teams. He has also served on the Academic Senate for California Community College's Technology Committee, and has represented the statewide Senate as a technology grant reader.

Mr. Diaz has conducted numerous staff development, and technology workshops, and is a frequent presenter at technology conferences. In 1998, he was recipient of the Outstanding Achievement for Technology in Education award by the Community College Foundation.