

ANALYZING STUDENT ACHIEVEMENT AND SATISFACTION AND FACULTY
SATISFACTION USING THREE MODES OF DISTANCE LEARNING
AT CHIPPEWA VALLEY TECHNICAL COLLEGE

By

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A Research Paper

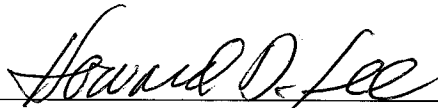
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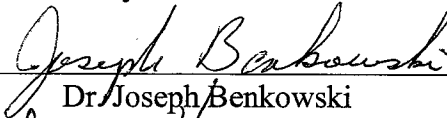
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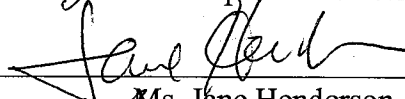


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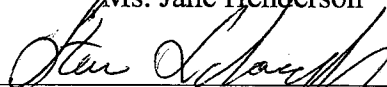
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ABSTRACT

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Analyzing Student Achievement and Satisfaction and Faculty Satisfaction Using Three Modes of Distance Learning at Chippewa Valley Technical College (Title)			
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Abstract

The number of people who desire a post-secondary education has grown due to changes in the global economy and personal economics. The National Center for Education Statistics (NCES) reported that the total number of distance learners enrolled in college-level institutions during the 1997-98 academic year was 1,363,670; by the 2001-02 academic year, that number had grown to 2,876,000 (Saenz, 2002, Waits & Lewis, 2003, p. iv). The effectiveness of distance education is under new scrutiny because of the paradigm shift toward computerized distance education.

How are schools going to provide distance education that satisfies students and faculty and also allows student achievement comparable to traditional classroom education? This study looked at the effect of three different distance learning technologies on teacher and student satisfaction and student grades. It found that student

and instructor satisfaction were lowest for IP video conferencing and for distance media that lacked adequate levels of interaction. Student satisfaction was highest in the control group, which was taught with traditional methods. However, grades were significantly higher for the experimental group than for the control group. Survey data pointed to a need for strong support services for distance education to be successful.

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Chapter I

Introduction

Background

Several situations combine to make the present time one of the most interesting ever in post-secondary education. The number of people who desire a post-secondary education has grown because of changes in the global economy and personal economics. On the global scale, many people have lost jobs to overseas workers (Thottam, 2004) and these displaced workers want retraining in a different area. Personal economics are impacted by the cost of living increase such that people who formerly wouldn't consider working outside the home are now actively seeking job training (Hoag, 2004). Also affecting personal economics are several government program changes that have either encouraged or forced those not employed to seek a post-secondary education (Hoag, 2004). At Chippewa Valley Technical College (CVTC) the mission is to fill educational needs. Prognosticators forecast for job growth over the next decade to be concentrated in 20 areas. The college has programs for 17 of the top 20 occupations predicted to grow (Hoag, 2004; CVTC, 2003). A basic economic truth is that people can, through education, improve their economic status (US Department of Labor, 2004).

According to its mission statement, CVTC has dedicated itself to improve the lives of students, meet the work force needs of the region, and strengthen the larger community (CVTC, 2003). Having successful graduates is the first step to meeting workforce needs and strengthening the larger community. The college offers distance

learning courses as alternatives to traditional courses for students unable to attend traditional classroom courses (CVTC, 2003). This research will analyze data to see how well distance education is serving the college's mission to improve the lives of students.

CVTC's strategic goals include meeting "customer needs of time, distance, and style of learning through flexible programming" (CVTC, 2003). Many colleges in United States have similar goals. The National Center for Education Statistics (NCES) reported that the total number of distance learners in the 1997-98 academic year was 1,661,100, of whom 1,363,670 were enrolled in college-level institutions (NCES, as cited in Saenz, 2002). By the 2001-02 academic year, the NCES reported the total number of distance learners had grown to 3,077,000, of whom 2,876,000 were enrolled in college-level, credit-granting distance education courses (Waits & Lewis, 2003).

The national increase in distance education enrollment is related to the increase in the number of institutions offering distance education. Mariani (2001) reported that 78% of the public, four-year and 62% of two-year institutions were offering distance education. One-third of all US universities offered distance education courses. Considerably fewer private colleges (19%) were involved with distance learning (Mariani, 2001). By the 2001-02 academic year, the NCES reported that 90% of the public, two-year, 89% of the public, four-year, and 40% of the private, four-year colleges were offering distance education courses (Waits & Lewis, 2003).

Many reasons have been proposed for the recent increase in distance learning in the US. The high rate of distance learning in public institutions may be related to a report that post-secondary institutions must offer distance education courses if they are to be

competitive (Christensen, Uzoamaka, & Kessler, 2001). Another report found that student interest in distance education makes all schools consider greater involvement in this form of course delivery (Mariani, 2001). Yet another researcher found that institutions were adding distance learning courses for economic reasons (Hofmann, 2002).

The disparity in distance education offerings between private and public institutions may not be coincidental but rather related to the different mission statements of the schools. The NCES report found that 55% of the post-secondary institutions considered developing distance education to be part of their mission (Waits & Lewis, 2003). The mission statement at CVTC advertises a “dynamic community focused on learning” (CVTC, 2003). The college appears to be among those 55% who consider distance education part of their mission.

The NCES report contained two pieces of information about schools that didn’t adopt distance education. The first NCES finding was that 60% of private institutions didn’t adopt distance education. The second NCES finding related lack of fit with a school’s mission as the main reason for not adopting distance education (Waits & Lewis, 2003). Perhaps these two findings are related. Perhaps distance education doesn’t fit a school’s mission.

CVTC’s desire to increase distance learning may stem from another part of the college’s mission which states, in part, “progressive technical education” (CVTC, 2003). In educational usage *progressive* means “aiming to develop individual capability and character in children rather than to achieve standardized results” (Oxford English

Dictionary-Online, 2004). Since CVTC considers distance learning to be an alternative for students who can't attend traditional classes (CVTC, 2003), the college may be increasing distance learning courses in order to be student-centered.

Other students in the United States have similar needs for alternatives to the traditional classroom (Waits & Lewis, 2003). Some students find the benefit of being able to learn at home through distance education an acceptable balance against less teacher interaction and more overall time (Schumm & Tursk, 2003). Many who, through their life circumstances, can't attend traditional courses want distance education to meet their needs (Witteck-Balke, 2000).

CVTC's strategic plan includes processes for continuous improvement to better identify and meet the needs of the students (CVTC, 2003). Surveys of students are required for all faculty members in their first three years at CVTC. Students of all the other faculty members are surveyed every three years as part of a continual staff development (CVTC, 2003). CVTC's concern for student satisfaction is like that of many others in education. Educators like Ryan (2001), Thurmond, Wambach, & Connors (2002), and Dibiase (2000), think student satisfaction is a topic worthy of a research project.

Distance education using modern media is still a relatively new concept; therefore, some initial definitions are appropriate. According to one researcher's view, the distance aspect can refer to either time or space. "At its most basic level, distance education takes place when a teacher and student(s) are separated by distance or time. Technology (i.e., voice, video, data, and print) is used to bridge the instructional gap"

(Martinek, 2002, p. 3). In contrast, traditional education takes place with teacher and student connected by time and space.

The time element is a very important aspect of distance education. Vera (2003) nicely differentiated synchronous and asynchronous learning. “Distance education falls into two categories – synchronous or Online learning, meaning students are present at lectures, chat rooms, at the same time, or asynchronous, ... meaning they do coursework on their own schedules” (Vera, 2003, p. 12).

The terms *distance education* and *distance learning* are often used interchangeably. In reality, *education* is “systematic instruction, schooling or training” (Oxford, 2004), whereas *learning* is “the action of receiving instruction or acquiring knowledge” (Oxford, 2004). So learning is what students do when teachers provide education.

Financial realities are a major concern in education. Schools face the daunting task of providing educational services in a fiscally challenging climate (Hawkes, 2000). The cost of higher education is large and growing. At the same time, revenue sources to fill that cost are shrinking. Budget concerns in higher education are making schools acutely aware of the need for increasing revenue and decreasing costs (Hawkes, 2000). Students in distance education courses represent revenue that the schools wouldn't otherwise receive. With the rise in the number of institutions which offer distance education, many schools feel pressure to keep their share of the student tuition dollar (Dibiase, 2000; Hofmann, 2002). CVTC response to the financially daunting task is part

of its strategic plan to be fiscally healthy. The fiscal health includes providing courses in distance education as a way to increase student revenue (CVTC, 2003).

CVTC recognizes that faculty members play an integral part in the college's strategic plan. One outcome statement in its plan speaks of recruiting, training, and developing quality instructors (CVTC, 2003). Two traits that quality instructors exhibit are in meeting the needs of their students and maintaining academic rigor (Dibiase, 2000). Distance education instructors search for teaching methods that provide for their students' needs just as traditional classroom teachers do (Darnell & McCrohan, 2001). The methods vary because the media are different. For example, having students do research, turn in assignments, and access lecture notes are some of the challenges distance education instructors need to overcome (Karber, 2001).

Part of CVTC's strategic plan calls for maintaining state-of-the-art equipment (CVTC, 2003). The growth of computer media in the US is phenomenal (Kurzweil, 1999). Seldom in history has technology become more widespread, faster, and smarter while concurrently becoming less expensive (Kurzweil, 1999). A paradigm shift toward more use of computers in distance education is coming because of this growth (Waits & Lewis, 2003; Dibiase, 2000). The paradigm shift resulted in several video or print courses being dropped at CVTC (CVTC, 2003).

The effectiveness of distance education is under new scrutiny because of the paradigm shift toward computerized distance education. Using new technologies well requires this change in basic questions: "'(H)ow can we serve adult learners?' is rapidly being supplanted by the harder and more interesting question, 'how can we serve adult

learners well?” (Dibiase, 2000, p. 132). Distance education teachers need to consider shifting toward more computer-based courses. Distance education teachers, including those at CVTC, must explore emerging course delivery methods in a quest to provide an academic education while being unable to have students physically present in the classroom (Schauer-Crabb, 2002).

Students, faculty, and schools are all interested in distance education and have their individual concerns. How are schools like CVTC going to provide distance education that satisfies students and faculty and also allow student achievement comparable to traditional classroom education?

Statement of the Problem

CVTC currently offers over 350 courses in distance education (CVTC, 2003). The college, faculty, and students should know if these distance education offerings satisfy students and faculty and allows student achievement comparable to traditional classroom education.

There are three primary stake holders in education. Post-secondary institutions provide the basics for higher education, a place to meet, learning materials, and reputation for the degree earned. The mission at CVTC is common in education. Post-secondary institutions, both colleges and universities, want to meet student needs, provide academic rigor, and still be fiscally responsible. Students want to get an education that is both relevant and legitimate. Teachers are concerned about meeting student needs, a

potential decline in course quality with distance education, and also with satisfying their own concerns about intellectual property and fair compensation (Wittek-Balke, 2000).

For an education to be effective, the students need to learn what is being taught. “The process (of distance education) is the tools and procedures used in educating students, and the product is the student and the knowledge gained from the program and its application in society” (Schauer-Crabb, p. 10, 2002). Isn’t it reasonable that the basic purpose of education is diminished if students don’t acquire knowledge about the material presented in the course? In addition, isn’t a course delivery method that turns students away from completion of their program ineffective?

If distance education is going to be presented along side traditional education, the schools, faculty, and students need to know that distance education fulfills their needs. Students’ grades in distance education need to compare favorably to grades in traditional courses. Students and teachers need to be satisfied with the distance education experience.

At CVTC a pilot study during the spring semester 2004 examined various course delivery methods. The goal was to measure student achievement and student and instructor satisfaction by using three distance- delivery methods and the traditional classroom method (Appendix A).

The administrators at CVTC agreed to finance the pilot program because the administration wanted to make an informed decision about an important education question: Which of the course-delivery methods in the study should the school support?

The Teaching and Learning Center (TLC) team at CVTC is charged with promoting technological advances among the faculty. The TLC team is composed of four faculty members, two staff members, and an administrator. The TLC team constantly explores new course-delivery technology in addition to acquainting faculty with technologies already in use.

The TLC team ran the pilot study. They were concerned about CVTC continuing the school's commitment to learning and success. The study was to find out how well certain delivery methods were working. The TLC team recruited three faculty members: one each from Communications, Math/Science, and Computer Information Systems (CIS). The three distance course-delivery methods were: Interactive TV (ITV), Internet protocol (IP) video conferencing, and a web-based course management system.

The TLC team felt it was important to have a control group in addition to the experimental sections for the pilot study. The control sessions from each course were taught using traditional classroom methods. The experimental sections were taught using the three distance education media. Each experimental section was taught first using ITV, then using IP video conferencing, and finally using web-based course management. The same course was taught by the same teacher to an experimental section and to a traditional classroom section. There were six sections; the basic chemistry experimental section, the basic chemistry control section, the written communications experimental section, the written communications control section, the XML experimental section and the XML control section. The data collected by the TLC team has not been analyzed or

evaluated. The data collected by the TLC team will serve as the basis for this research thesis.

Several vendors sell distance education products. For the pilot study, the interactive TV (ITV) system used was a product of VSGI Corporation called *Polycom V500* (VSGI, 2002). As its name implies, it had a television camera and television set at both teacher and student sites. Therefore, teachers and students could both see and hear each other. With ITV, the students were separated from their teachers by space but not by time since the ITV instruction was synchronous. As opposed to previous iterations of interactive TV, which used phone lines or satellite reception, the pilot study ITV used digital signals sent over the Internet (Rundle, 2004). The Internet delivery allowed classes to be held any place that had a broadband Internet connection and appropriate camera and TV equipment.

The IP video conferencing system used in the pilot study was a product of Centra Corporation called *Centra 7* (Centra, 2004). IP video conferencing didn't use traditional television cameras and receivers but rather web cameras and computer video displays. The web cameras were designed with limited video resolution and audio quality so that the data could be streamed through the Internet even with a very narrow bandwidth. The limited audio and video quality also limited the quality of the interaction between teacher and student (Rundle, 2004). The sessions in IP video conferencing were digitally recorded so that students could view sessions later.

The web-based course management system used in this study was *Blackboard 6.0*, a product of Blackboard Inc. The web-based course management system allowed

teachers and students to interact synchronously through text chat sessions. When the teacher was not online, students could log on to their computer and access audio or visual information that the teacher had previously submitted. The students turned in assignments that were either automatically checked or that the teacher would check after submission (Rundle, 2004).

Three courses were part of the pilot study. Basic chemistry calculations is a course taught at Chippewa Valley Technical College. According to the course description, it is “designed to develop the skills in chemistry which are a prerequisite for entry into associate program chemistry courses” (CVTC, 2003, p. 199). Basic chemistry is a prerequisite for many health-related programs. Students can also fulfill this prerequisite by a grade of C or better in a high school chemistry course. Many students opt to take this course if a number of years have elapsed since they were in high school. The course is also required for students who failed the chemistry section of the National League of Nursing (NLN) test (CVTC, 2003). Basic chemistry is offered using four delivery modes: traditional classroom, ITV, Internet-based or video-based. (The video-based mode ended after spring 2004).

XML Programming is:

“designed to provide the student with the next step in web development after HTML and JavaScript. XML-eXtensible Markup Language is the foundation for B2B (business-to-business) commerce. HTML is limited to the presentation of how information looks on the computer screen. XML is used to facilitate the manipulation of the document, information, text,

and data contained within the document. XML addresses the problem of using different data formats for different applications. The format of this course is lecture with extensive labs to apply XML principles to database information for Internet. Prerequisite(s) 107-100 Programming Concepts and 107-107 Web Programming I” (CVTC, 2003, p. 147).

XML represents three of the 36 possible credits a student can choose to fulfill the 18-credit component in programming for the Programmer/Analyst two-year associate degree.

Written Communications, offered at CVTC, “(t)eaches the writing process which includes prewriting, drafting, composing, revising, and editing. Through a variety of writing assignments, the student will analyze the audiences and purposes for writing, research and organize ideas, and design documents based on specific subject matter” (CVTC, 2003, p. 188). Written Communications is required in 34 programs ranging from accounting to wood techniques.

Purpose of the Study

The purpose of this study is to analyze and evaluate the data collected through the TLC pilot study to determine the effectiveness of the three distance-delivery methods as well as the traditional classroom method.

This study hopes to clarify for students, teachers, and CVTC the statistical information and its impact on a basic question — How well do different course delivery methods meet academic needs?

Questions of the Study

To meet the purpose of analyzing student and teacher satisfaction and student achievement using traditional and distance education, several questions need to be studied.

1. How satisfied are students with the quantity and quality of teacher-student interaction via each distance-education method? The interactions surveyed included exchange of written information, verbal communication, and timeliness.
2. How does student satisfaction among the three distance-education methods and traditional classroom compare?
3. Using factor analysis, what significant contributions to student satisfaction are related to delivery method and course enrolled?
4. How satisfied are teachers with the quantity and quality of teacher-student interaction via each distance-education method? The interactions surveyed included exchange of written information, verbal communication, and timeliness.
5. Using factor analysis, what significant contributions to teacher satisfaction are related to delivery method and course enrolled?
6. What is the level of student achievement using each of the distance-education methods? This question needs to allow for students who don't complete the course.
7. What comparison exists among the three distance-education methods and traditional classroom methods in student achievement?

Hypotheses

There appears to be a wide variability of results in previous studies comparing traditional and distance education (Russell, 2004). Using factor analysis, it may be possible to clarify for this study what are the effective and ineffective procedures in distance education (SPSS, 2003).

Two possible outcomes exist: either a significant difference will exist between and among the different methods or there will be no significant difference. For achievement, Russell (2004) noted several research studies that indicated no difference should be found. California State University at Northridge compared virtual and traditional classroom learning and found that students in the virtual classroom had 20 % higher scores (Jones, 1999) than traditional students. On the other hand, in an extensive study comparing delivery methods, Nova-Southeastern University (Fredda, 2000) found students in campus-based format were more successful than those in Internet-based formats. In their review of literature, Lesh and Rampp (2000) compared many studies in computer-based education and presented arguments for and against the use of computer-assisted distance education.

The numbers by the hypotheses below match the research questions above numbered the same way.

1. Students will be generally satisfied with the interactions for each of the course delivery methods. Teachers want their students to succeed and thus are willing to dedicate much time and effort to make student success possible.

2. Students in the traditional classroom will be more satisfied with the effectiveness of their education than those using the distance delivery methods and they will give positive evaluations for the flexibility in time commitments which the asynchronous delivery methods provide. Students are familiar with traditional classrooms and it seems reasonable that this familiarity will be satisfying to the students.
3. Student satisfaction will be highest in XML. CVTC students feel general education courses like written communications and chemistry are not satisfying.
4. The teachers will be satisfied with the interactions for each of the course delivery methods. The teachers selected were chosen because they had generally positive experiences with distance education.
5. The factor most highly related to teacher satisfaction will be the course taught. Since the teachers taught only one class for the pilot study and classes were only taught by one teacher, there is a one-to-one correspondence. That is, the satisfaction of the teacher will be more a product of the person selected than of the method used to deliver the course.
6. Students' grades will not vary significantly among the trial methods nor between the trial and control groups. These results will not vary even when student course completion is considered. Studies consistently point to no significant difference in student achievement in distance education methods versus traditional classroom methods.

7. Student achievement will be highest for XML. The students selected the program they are in and thus have more ability in that area than in less related courses, such as written communications and chemistry.

Rationale for the Study

1. The mission statement of CVTC states that the college “delivers superior, progressive technical education which improves the lives of students, meets the workforce needs of the region, and strengthens the larger community” (CVTC, 2003). A superior education implies that students’ learning is highly valued and a high priority. Therefore, analyzing the data on delivery methods should consider whether the students actually learned what was taught. Often-used measurements of learning include course and exam grades. These were two of the pieces of information contained in the TLC pilot study data.
2. Berube (1998) makes a strong case that the usual measures of efficiency the business world uses don’t apply to education. Instead, he advocates that efficiency be measured with student learning as a product. Berube’s ideal is “...a university where student writing is copious and carefully read, and where students themselves are names, faces, and advisees, not modular production units” (Berube, 1998, p. 38). CVTC promotes progressive technical education and student learning (CVTC, 2003). Therefore, it seems that the CVTC idea of efficiency should be more weighted toward learning and less toward cost. The information gathered in the TLC pilot study was only related to learning and

satisfaction rather than cost per student or other monetary factors. While monetary factors may be considered by the administration when finally adopting a particular delivery method, such matters were not part of the pilot study.

3. The TLC pilot study collected data pointing toward the importance of student views in education (Appendix A). Student satisfaction and achievement both show that the pilot study was student-centered. Whether CVTC considers the pilot study results as most important in their decision making, at least the study attempted to consider students' views highly.
4. Apart from helping CVTC decide what delivery methods to support, CVTC teachers can use the information from this study to evaluate their methods of presentation in whatever method they use for content delivery. The teachers can use obvious strengths and weaknesses of each delivery method to determine what works and why.

Assumptions of the Study

1. Each course has different goals and objectives. Each teacher has different strategies and methods. Each student learns at different speeds and in different ways. By comparing three different methods taught by three different teachers in three different courses, the TLC team hopes the pilot program can give an overall picture with clear enough focus to address the breadth and depth of the above-stated basic question, How well do different course delivery methods meet academic needs?

2. This study assumes that by comparing the pilot program to the traditional course outcomes, a legitimate evaluation can be made about the effectiveness of traditional vs. non-traditional delivery methods.
3. The data of any study is assumed to be valid. In this case, the assumptions were that the teachers calculated the course grades correctly, the tests were scored and graded properly, and students and faculty submitted surveys that were carefully completed.
4. The surveys submitted by the students and teachers are like those used throughout CVTC. Since the college continues to use them, we can assume that the surveys gather relevant information that offers appropriate insights into student and faculty views.

Definition of Terms

1. *Blackboard* is a web-based course management system developed by Blackboard Inc. Blackboard has tools that allow student-teacher interaction in email, computer applications, and chat room settings. Student projects may be submitted a number of different ways. Grading is also a component of the program (Blackboard, 2004).

2. *Centra* is a software provider that makes an IP video conferencing product called *Centra 7*. This product allows voice, video, and computer software to be sent out to remote sites. Those at the remote sites are able to share software and modify shared programs using their keyboards. This technology may be used either synchronously or asynchronously (Centra, 2004).
3. *Distance education* refers to teaching courses with students and teachers separated by distance or time communicating through media (Oxford, 2004).
4. *Distance learning* is the transformation that takes place in students when exposed to distance education (Oxford, 2004).
5. *Interactive Television (ITV)* is a method of course delivery in which a set of video cameras and computers transmits audio and video from the teacher at one site to students at remote sites. A camera at each remote site transmits audio and video back to the teacher (Rundle, 2004).
6. *Internet Protocol (IP) video conferencing* is a method for two-way audio and video communication to take place over the Internet. The type of IP video conferencing used in the pilot program is Polycom (Rundle, 2004).
7. *Polycom* is a hardware and software vendor that markets a product called Polycom Media Center. This product has a base station in two or more locations. People in any location can see and hear people in the other locations. This technology may be used either synchronously or asynchronously (Rundle, 2004).
8. *Teaching and Learning Center (TLC)* team is a group of faculty and support staff at CVTC. This team provides training in technology to CVTC teachers. The

mission statement for this group says in part, “The Center is dedicated to the purposeful integration of technology, innovation, and teaching at CVTC and will pursue these strategies to do so...”. The school also uses the team for evaluation of various programs.

9. *Text chat* is “real-time communication between two users via computer. Once a chat has been initiated, either user can enter text by typing on the keyboard and the entered text will appear on the other user's monitor” (Webopedia, 2004).
10. *Web-based course management system* is the classification for distance delivery methods that use the Internet to connect instructors and students. These systems make documents available to the students electronically and allow students to submit assignments and quizzes electronically for the instructor to grade. Web-based course management systems include *Blackboard 6.0*, a product of Blackboard Incorporated, and *Desire2Learn*, a product of Desire2Learn Incorporated. (Rundle, 2004).

Limitations of the Study

1. This study will analyze only the student and teacher components of the overall question of the effectiveness of various course delivery methods. The students and teachers in the three pilot and three control classes were the subjects of the study. This study took place in the spring semester 2004 at CVTC. Evaluations of teacher and student satisfaction as well as student achievement form the basis of the study. The research is an analysis of data collected in a comparison of

control (traditional classroom) and experimental (pilot study) groups, as well as a comparison of different delivery methods. The student and teacher surveys for the pilot study were developed from the CVTC standard survey.

2. The pilot study instructors were not randomly selected. Instead, the TLC team tried to select teachers of various technological abilities. An initial request for volunteers did not produce enough instructors to fill the program. The criteria for selecting instructors were that they should have previous experience with distance education, specifically ITV, and that they should have taught web-based courses.
3. The study students were also not randomly selected. The school ran the study using its usual registration strategy. Thus, there was no opportunity to neither sample randomly nor assign groups for students participating in the study.
4. A study in which participants are selected randomly is experimental. Since the teachers and students were not randomly selected, the study was quasi-experimental rather than a pure experiment (Gillett, 2004).
5. The sample size of instructors, courses and students was insufficient for predictive statistics (Gillett, 2004). CVTC has hundreds of full-time and adjunct instructors teaching several hundred courses to several thousand students (CVTC, 2003). A sample of three faculty members, three courses and less than 100 students is not large enough to formulate predictive statistics that would be applicable to the population of all students, faculty, and courses at CVTC.

Methodology

The TLC team developed and administered the teacher and student surveys. They made the selection of criteria, students, instructors, evaluation instruments, and decided the order of presentation for the experimental sections. The TLC team responsible for the pilot study has given permission for the information they gather to be used for this study. This study will statistical analyze and evaluate the data collected in the pilot study.

The pilot study had three full-time teachers from three different areas of instruction. Each instructor taught a specified course using two different course delivery methods. One delivery method used traditional classroom instruction. This group served as a control. The second method presented the same coursework to another group of students using three different delivery methods: For the first five weeks of the semester, teachers used ITV for instruction. For weeks six to 10 of the semester, teachers instructed the students using IP video conferencing. For weeks 11 to 15 of the semester the teachers instructed the students using web-based course management.

At the end of each third of the semester, teachers administered at least one exam and calculated course grades for both sections in each course. These sample exam scores and course grades will be analyzed to judge student achievement.

Student satisfaction will be evaluated by analyzing the results of a survey that all students in both the experimental and pilot project completed. Students completed this survey at the end of the time for each different delivery method.

Teachers also completed a survey at the end of each section. The survey included sections for teachers to note any special circumstances during the trial. Teacher satisfaction will be evaluated by analyzing the results of the teacher survey.

The data will be analyzed with analysis of variance (ANOVA). The data collected through the surveys consisted mostly of Likert data. The survey statements asked students to respond using the choices *strongly agree*, *agree*, *disagree*, and *strongly disagree*. These responses could be transformed into numbers as ratio data. Ratio data uses numbers that are equally far apart. As stated above, the pilot study would be classified as a quasi-experiment. For ratio data in a quasi-experiment, the appropriate statistic is ANOVA. The statistical analysis of the variance between the three different courses taught using three different methods compared to the two different groups makes a 3X3X2 ANOVA (Cowl, 1993).

Chapter II

Literature Review

Since the proposed research touched on several areas of educational literature, the review also was fairly inclusive. Student satisfaction, teacher satisfaction, and student achievement in distance education were all part of the review. Several different distance learning media were utilized in the pilot study. They, too, were part of the literature review. Finally, good pedagogical techniques were reviewed. These areas served to formulate the research methodology which follows.

Distance Learning

Distance learning has a surprisingly long history, being advertised as early as 1728 in the *Boston Globe* (Everett and Pershing as cited in Kung, 2002). About that same time, shorthand correspondence courses began in Europe (Sherr as cited in Saenz, 2002). Phillips reported a much later date, 1840, for shorthand correspondence courses offered in England (as cited in Wittek-Balke, 2000). Regardless of when or where distance learning started, its usage has grown and changed especially in the last decade (Waits & Lewis, 2003).

Research has indicated several reasons for the recent expansion in distance education (Peterman, 2000; Dibiasse, 2000; Schauer-Crabb, 2002; Thurmond, Wambach & Connors, 2002). Some educational institution administrators considered their institutions were not meeting the needs of students who were unable to attend traditional

classes. By serving these students, many school leaders thought they could increase enrollment.

A desire to increase student enrollment could only be part of the answer to the growth in distance learning. Being first to adopt what's new has been very popular (Peterman, 2000; Dibiase, 2000). Institutions that adopted distance learning early had greater learner satisfaction. A collegial attitude developed as both teachers and students were faced with novelty. Students thought of themselves as pioneers. The lack of a standard with which to compare their experience resulted in higher student satisfaction scores.

Being first to adopt (the process taking place between hearing about innovation and using it, Schauer-Crabb, 2002) caused some schools to be deeply involved in distance education before they understood its effective usage. A more careful study was shown to lead to better use of distance education technology. Aspects to study included, proper uses for distance education and the teachers and students involved.

Other researchers weren't quite as critical of those who were quick to adopt new technologies such as distance learning. Thurmond, Wambach, & Connors (2002) in their study how to make the transition from the traditional classroom to distance learning, cited one source to support the claim that the transition would not be difficult. In their analysis, technical college instructors' main teaching activities didn't include lecturing. Instead, the instructors helped students to assimilate information and provided assistance with projects. Thus, instructors did not need new methods to find success in distance education. In their opinion, other faculty duties at technical colleges mirrored those of

good distance educators. Good instructors reviewed and commented on student work and kept up in the field.

Learner Satisfaction

Many characteristics were common to satisfied distance learners (Hofmann, 2002; Schauer-Crabb, 2002; Uhlig, 2002; Martinek, 2002; Beets and Lobingier, 2001). Modern distance media required students to have at least average knowledge of computers or other technology, including the ability to e-mail and use the Internet. Satisfied students reported the Internet media to be stimulating. The literature also showed that the method students preferred in obtaining information played an important role in student satisfaction. Those who preferred non-verbal means of communication had better recall after completing a multi-media course, such as IP video conferencing, than those who preferred verbal means.

Satisfied students exhibited a strong desire to learn because they knew that education required a strong contribution on their part. They knew that distance education courses would be more work rather than less and that they would be on their own much of the time. Students who expected distance education to be less of a commitment would not find satisfaction when their expectations were not fulfilled. Students with a strong commitment to education didn't equate greater time commitment and more course difficulty. One study on distance learning found that when rating course difficulty on a scale of 1 (most disagreement) to 5 (most agreement), the mean of the tabulated student responses to a survey question stating that online courses are easier than traditional

courses was 4.01 (Mulvenna, 2002). At least in this study, most of the students stated that online learning was easier.

Distance learning had more flexibility when it was asynchronous (not occurring at the same time). Students decided when they would learn. In a survey of potential distance learning students, 88% stated that time flexibility was an important or very important reason for possibly electing distance learning (Kung, 2002). Asynchronous flexibility extended also the location where students learned (Peterman, 2000; Schumm & Tursk, 2003). Students found satisfaction when they did not have to commute to school—especially in major urban areas. The students used the travel time saved to study the material instead. In the end, their families reported the same amount or more time spent away from family activities.

Satisfied students were goal-oriented, self-motivated and self-disciplined. Some students were even described as compulsive. The self-disciplined students were able to use the freedom and flexibility of the distance learning technology to satisfy their goals and balance other important aspects of their lives.

In the traditional classroom, the teacher often paced the course through homework assignments and gave insights into which aspects were important to study. Without that teacher contact, distance learning students needed to pace themselves and determine which course points were important. Self-disciplined students were able to study even when they were tempted to slack off because they were not closely supervised. Successful students had fewer interactions with their teachers; they spent more time studying and considered that they personally were actively involved.

Some researchers found that older students were more satisfied with distance learning (Martinek, 2002; Wittek-Balke, 2000). Because the students were older, the researchers found that they had a more serious attitude toward their courses and could find satisfaction. Older students were also found to be more motivated and have clearer goals. In addition, older students were more active in their education and willing to sacrifice in order to succeed.

Older students usually were either in a profession and using the courses to achieve a goal, or else they were changing professions and saw the need to complete a program in order to solve financial obligations. The goals in each case were tied to salary and advancement.

One study expanded on the connection between goal orientation and salary. Distance learner graduates on average earned twice the salary as traditional campus graduates. The study cautioned that making a cause-effect comparison would be inappropriate, since the distance learners were older, already employed, and pursuing professional advancement (Schauer-Crabb, 2002). One might, in fact, make a claim that seeking distance education was a result of having a particular career rather than vice-versa.

While many of the traits discussed so far would seem to be common to successful students in general, a special case involved introverted and extroverted students (Schauer-Crabb, 2002; Peterman, 2000; and Dibiase, 2000). The research indicated that an introverted person might succeed and an extroverted person may have had more difficulty in distance learning. Introverted students were seen to thrive while using distance

learning, since they often felt shy in face-to-face situations. One student's comment supported this claim: "This is my first total online class. I find it allows me to 'participate in class' more than the traditional classroom. I was the one who didn't like being called on" (Dibiase, 2000, p. 133).

Rather than thinking of distance learning as being isolating, satisfied students adapted to distance education and used alternate means to get to know their fellow students and instructors. The research implied that students didn't necessarily lose personal closeness while using distance education.

In summary, the satisfied distance learners:

1. Were goal-driven. They knew what they wanted to accomplish. These goals often had extrinsic components, like salary increases and career advancement, but also included intrinsic components like love of learning (Dibiase, 2000).
2. Were self-disciplined. Even though successful students had very busy lives with work and family obligations, they were able to dedicate time in their schedules to complete course work (Mariani, 2001).
3. Were action-oriented. They were active in their courses and communicated extensively with their teachers and completed assignments (Wittek-Balke, 2000).
4. Were introverted. Students who were reticent to speak up in traditional courses were less inhibited in distance education and thus were able to state their ideas and have those ideas critiqued by the teacher and other students (Dibiase, 2000).

Ryan (2001) found 70% favorable responses from the traditional group, 84% from the ITV group and 91% from the web-based group. His research implied that the web-

based group had more satisfaction than either the ITV group or the traditional group. Thurmond, Schumm & Tursk (2003) found that 100% of the experimental group (distance learners) responded that they would take distance courses in the future and that those who had traditional methods preferred not taking distance courses. In these two cases, measuring learner satisfaction was rather straight-forward (Ryan, 2001; Thurmond, Schumm & Tursk, 2003). Both simply asked if students would take another class by the same medium, connecting a willingness to take more courses with learner satisfaction. The overall samples of these studies were small but had similar results. Both studies indicated that those who tried distance learning liked it and that those who didn't try it thought they wouldn't like it.

Of particular relevance to the CVTC pilot study was learner satisfaction using ITV. ITV was special because it had two distinct groups: the students at the host site and those at a remote site. Even though the reliability of ITV has improved over time, Anderson, Banks, & Leery (2002) found the reaction to technical breakdowns to be polar opposite between the host and remote students. Since the host site students had the teacher in the room, they found breakdowns limited their education and caused unnecessary distraction. Remote site students knew the technology was necessary for their success in the class and thus were more tolerant of breakdowns, because the alternative would have been a long trip to the host campus. The reactions to breakdowns were not enough to influence the overall satisfaction. The host site students were still more satisfied than their remote site counterparts.

Determining what aspects of the distance learning experience contributed to levels of satisfaction proved elusive. Students often found difficulty distinguishing between levels of satisfaction with the delivery method and satisfaction with the instructor. If the same teachers used different distance learning media, then any differences in satisfaction would have been due to the distance learning media. When looking at the results, these researchers had to conclude that while the statistical analysis was able to separately evaluate the satisfaction related to instructor from that related to the media, the students apparently weren't satisfied. "Nevertheless, in this study we produced evidence that students at the host sites and particularly at the remote sites failed to separate their perceptions of the instructor from their feelings about taking ITV courses" (Anderson, Banks, & Leery, 2002, p. 166).

Distance Education Media

Picciano's (cited in Schauer-Crabb, 2002, p. 15) table, when abridged, serves as a fine foundation for a discussion of distance learning technologies.

Table 1 *Advantages and Limitations of Various Technologies*

Technology	Advantages	Limitations
Interactive Television (ITV)	Interactive, Graphic, Immediate Feedback	Development Time, Expensive, Complex Technology
IP videoconferencing -synchronous-	Interactive, Multimedia, Immediate Feedback, Participative	Development Time, Expensive, Complex
Web-based course management system -asynchronous-	Interactive, Graphics, Self-Paced	Development Time, Expensive, Complex, Access to Technology, Rapidly Evolving

CVTC's pilot project tested distance education technologies that were widely used. According to Mariani (2001), in 1999, the top three distance education technologies by enrollment were web-based course management systems, ITV, and video cassette. The only one of these not part of the pilot study was the video cassette technology.

In the past, ITV consisted mostly of closed-circuit communications between school campuses. The information was carried by cable TV, sent by satellite, or transmitted over phone lines. In recent years, the older carriers began to be replaced by Internet connections. As a result ITV has become global. CVTC determined that ITV could eventually connect school to home (Rundle, 2004). Such a connection would broaden the reach of distance education to just about any location.

Two aspects of Table 1 needed further explanation (Mariani, 2001; Schauer-Crabb, 2002). Table 1 stated that ITV and video conferencing were expensive, but schools tended to value the increased enrollments that accompanied these technologies more than highly than the increased costs that the schools incurred. All technologies in Table 1 were indicated to be expensive. The expense in ITV was basically the cost of the equipment. The computer-based distance education technologies had continuing costs due to software licenses.

Distance education available to the students at any time was found to be important (Mulvenna, 2000; Uhlig, 2002). IP video conferencing which was mainly synchronous had less flexibility in time than web-based course management systems, which were

mainly asynchronous. Asynchronous technology worked best if it were available to students 24 hours a day and seven days a week.

The very last technology in Table 1 was web-based course management systems. Schools that did not tie distance education courses to their academic calendar were also at an advantage (Mulvenna, 2000; Uhlig, 2002). Students who didn't own a personal computer needed to go to a computer lab or other location and thus had less convenience than those who had a computer at home. When students were confined by technology to certain locations, their distance learning experience was less satisfying (Mulvenna, 2000).

Table 1 listed *complex* as a disadvantage for all three technologies. Complexity was related to failure rate and the degree of transparency—how much interference the media caused with the connections among teacher, material, and student (Saenz, 2002; Hofmann, 2002; Schauer-Crabb, 2002). Transparency needed to include not only the course, but also course registration, course access, and evaluation in order to increase student satisfaction. By understanding the distance education media, students could make themselves ready to succeed. The students had a difficult time learning complex technologies, especially if schools didn't offer them technical training. Complex technologies had more breakdowns and also required more time for students to learn how to use them. IP video conferencing and web-based course management systems were particularly complex. The specific disadvantages included lack of equipment access, equipment failure, failure of online connectivity, and lack of technical skills needed for course completion.

Some research conflicted with two aspects of Table 1 (Rundle, 2004; Schauer-Crabb, 2002; Mulvenna, 2000). The section of Table 1 concerning IP video conferencing listed multimedia as an advantage. The multimedia aspects of this technology included both visual and audio components. Compared to the traditional classroom, audio transmission in IP video conferencing had an annoying delay. When CVTC used IP video conferencing for administration meetings, they transmitted the audio portion using phone lines to obtain acceptable sound quality and minimize the time delay. Others found IP video conferencing to be such a distraction that they ignored the video. The section on web-based course management systems stated that they were only asynchronous while others found web-based course management systems were also synchronous when real-time text chats and teacher presentations were used.

The weight given to the factors in Table 1 was the subject of another research study. In that study, two-way communication was preferred by schools regardless of the preference level of students (Schauer-Crabb, 2002).

Table 1 did not list advantages and disadvantages for the traditional classroom but spoke of some technologies as having an advantage because they were interactive or intimate. According to the literature, the traditional classroom mistakenly has been viewed as intimate when such intimacy was not demonstrated (Mulvenna, 2000).

An aspect of distance education technology that contributes to learner satisfaction and success is the degree of social presence. The best connections between teachers and students came from face-to-face media. Even though the telephone is not face-to-face, it had a high level of social presence because it was socially oriented. Apparently, the level

of social presence wasn't directly tied to the interactivity of the media since ITV was less socially oriented and thus had a lower degree of social presence (Saenz, 2002).

Table 2 was adapted from research on social presence and compared the level of social presence through several selected interactions (Saenz, 2002). Those offering highest social presence were listed at the top of the table. Each successive media offered a lower degree of social presence. Communication cues increased the degree of social presence.

Table 2 *Degree of Social Presence by Media Type*

Degree of Social Presence	Media Type	Communication Cues	
		Non Verbal Cues	Verbal Cues
Highest	Face to Face	x	x
	ITV	x	x
Lowest	Business Letters		x

The word *immediate* derived from the same root as the word *medium*—seer. The negative prefix *im-* gives *immediacy* the meaning “without any intermediary”; in other words, a direct connection (Oxford, 2004). Verbal immediacy came from teacher behaviors like praising students for their ideas, calling students by their first name, using the term *we*, and using emoticons (keyboard characters that pictorially display emotions such as ☺) (Saenz, 2002). Successful distance education teachers found that the emoticons could bridge the non-verbal gap discussed in Table 2 above. By using non-verbal cues, the level of social presence was elevated. Thus, immediacy was increased.

Business letters were included to compare them to web-based course management systems, both of which and provided little opportunity for non-verbal cues like smiles or nods. Table 2 included peer interaction in its analysis since students wanted more exchanges with their peers in their classes (Saenz, 2002).

A significant difference existed between business letters and web-based courses. Mail delivery took several days which increased the time between interactions. One researcher noted this delay in delivery and saw the immediacy of web-based courses as a disadvantage since the volume of e-mail to read, reflect on, and respond to was overwhelming (Mulvenna, 2000).

Media with disadvantages and low social presence scores improved their standing when other telecommunications like telephone, Internet, and text chat were used as supplements (Schauer-Crabb, 2002; Mulvenna, 2000).

Teacher Satisfaction

Teacher satisfaction was found to be tied to a number of different factors (Schauer-Crabb, 2002; Carnevale, 2000; Peterman, 2000; Beets & Lobingier, 2001; Inman & Mayes, 1999). Teachers were satisfied when students grew academically. They even enjoyed learning from their students. Satisfied teachers were flexible and planned ahead. For web-based course management systems, the whole semester course needed to be ready before the semester began. The amount of time necessary to get a course ready would require as much as 200 hours of faculty time. Because of such a large time commitment, forcing instructors to migrate courses to distance education lowered teacher

satisfaction. Teachers who organized the learning ahead of time were more satisfied than those who were spontaneous and liked to adapt lessons at the last minute.

Distance education teachers who were concerned not only about their students but also thrived on helping other innovative teachers were particularly satisfied. Innovative teachers liked helping others with both technology troubleshooting and methodology. Part of their satisfaction came from the technology itself. Distance education teachers liked being on the cutting edge of technology. The more acquainted instructors were with technology the more they liked teaching via distance learning.

Two studies found that teachers who desired autonomy may have been unhappy with online learning. Distance education required a fair amount of interaction between school support staff and instructors. Also, distance classes that were on the Internet were under more scrutiny by the administration. Issues of control led to friction between instructors and administrators (Martinek, 2002; Inman & Mayes, 1999).

Given all the research that pointed to the need for teachers to interact with students, it was not surprising that successful distance education instructors received satisfaction from those interactions. Satisfied teachers were approachable. They needed to enhance alternative means of communication when ordinary communication was limited in the distance environment. Teachers found means of interaction even in mediated instruction even though students didn't feel as strongly about the need for interaction. Those teachers who were approachable without being pushy were more satisfied than those who thought they needed to initiate all interactions. Some students

valued their convenience more than interaction. Adaptability in even these situations was one key to teachers gaining satisfaction.

Not all research agreed on ways to achieve teacher satisfaction. Martinek (2002), for instance, disagreed concerning compensation. She found compensation to be neither a positive nor negative factor influencing teacher satisfaction in distance education.

Many researchers found the way administration handled instructor work-load influenced teacher satisfaction (Schauer-Crabb, 2002; Mulvenna, 2000; Dibiase, 2000; Darnell & McCrohan Rosenthal, 2001; Beets & Lobingier, 2001). Teacher satisfaction depended on appropriate understanding by school administration. Compensation had to be adequate, and the amount of effort required needed to be recognized. Administrators needed to see that distance education required instructors to spend more time with each individual student. Even beginning a distance learning project was a huge time and effort commitment. If administrators didn't acknowledge that larger time expenditure, they might have treated student load the same as a traditional class and thus overworked the teacher. Distance learning classes had fewer students because interactions were individual. In addition to student load and new courses, the teachers required time to learn the technology media. The distance learning courses needed to be treated with respect. If administrators saw traditional and distance learning as equals, inter-faculty perceptions concerning promotion and tenure could be solved. Educators needed reassurance that their authority and jobs were not in jeopardy and that administrators would not hire less skilled workers to run the prepackaged courses.

Traditional teachers perceived that distance education teachers would never come to campus or attend committee meetings because distance courses didn't have a set meeting place. In reality the distance education required teachers to spend more time overall than traditional education did because almost all interactions were one-to-one. Those who were able to adapt to the larger time commitment and more structure were satisfied with distance learning. Those who thought they could teach in the traditional method were disappointed when faced with the intense time and labor demands of distance education. When teachers perceived that distance education was not effective, inter-faculty tensions rose. The greatest roadblock to teachers' wholesale acceptance of distance education was found to be skepticism about the educational effectiveness of distance education (Schauer-Crabb, 2002; Mulvenna, 2000).

Academic Success

One factor limiting student success was course completion. Students who started courses but did not complete them had less success than those who completed their courses. Course completion was a special concern for distance learning courses since they had a higher dropout rate than traditional courses did (Mulvenna, 2000). When researchers asked students why they or their classmates dropped out of school, they got a variety of responses (Saenz, 2002; Fujita & Alston, 1994; Martinez, 1998; Kemp, 2002; Mulvenna, 2000). One contributing factor was a lack of peer and group interaction. Another factor was the lack of familiarity with the distance learning media. The later

students registered for courses, the more likely they were to drop out. In some cases, student finances and other responsibilities were the reasons cited for dropping out.

Some ideas about what led to persistence weren't valid. Kemp (2002) hypothesized that previous success in distance learning would predict future success. But by comparing students who had previously experienced distance learning with those who were novices in distance learning she was unable to detect a statistically significant difference in persistence.

The most consistent predictor of academic success was course grades (Van Beek, 2002). Distance education was at least as effective, if not more so, than traditional methods (Mulvenna, 2002; Russell, 2004; Hofmann, 2002; Dibiase, 2000). Research studies fell into one of two categories: either there was no significant difference or there was a difference in learner outcomes. Russell (2004) recorded 380 studies that recorded no significant difference. Of the 52 studies that did record a difference, more than half favored distance learning.

Several factors could account for the achievement of distance learners (Hofmann, 2002; Dibiase, 2000; Urven, Yin, & Bak, 1998). Distance learners were active learners who were responsible for their own achievement. They used facts that they learned to solve problems. They gathered the facts through questioning their teachers and fellow students. Traditional students take notes in a more traditional lecture format and are passive learners.

Some measures of academic success were common for distance and traditional courses (Schumm & Tursk; 2003; Inman & Mayes, 1999; Thurmond, Wambach, &

Connors, 2002). Students with good teachers had more academic success than those with poor instruction. One of the best predictors of achievement was the quality of instructor-generated materials. The higher the quality of the instructor-generated materials, the more was learned. Grades also varied based on site, preparedness, and age. Students who attended class sessions, whether they were traditional or distance learning students, got better grades than those who didn't. Students who had previous academic achievement had higher grades than those who didn't.

Some have attempted to measure learning using methods other than grades. A study on two different methods of course delivery (Van Beek, 2002) provided evidence that while grade point average (GPA) was not an exceedingly accurate measure of meeting course objectives, it was, in fact, about the only consistent measure that existed.

Some attempted to find alternatives to GPA as measures of learning (Wade, 1999; Mulvenna, 2000). When student writings were analyzed, no differences were found between distance and traditional courses. Students were also asked to rate their success in a survey. The results of the survey were mixed since the students' definition of success may not have been related to academic achievement. Even though most students felt they were more successful when a teacher was present and when they had deadlines, a lack of correlation with course grades mitigated the results that seemed to point to traditional students having greater achievement.

Pedagogical Techniques

Some research indicates that almost any course could be adapted to be taught using distance learning. Some even claim the adaptation was easy. The important factors to consider in education were the methods and not the media. Media were found to affect educational efficiency but not how well students learn (Carnevale 2000; Schauer-Crabb, 2002; Husson & Waterman, 2002; Hofmann, 2002). For success in any educational endeavor pedagogy was important. Distance learning required teachers to adopt a new paradigm of instruction. In the new paradigm, students had increased responsibility in achieving academic goals. Students needed to be actively involved. Students had good learning experiences when they had teachers who understood sound teaching strategies and principles of good practice for online teaching.

Some methodologies were especially successful in distance education (Schauer-Crabb, 2002; Dibiasi, 2000; Thurmond, Wambach, & Connors, 2002; Hofmann 2002; Martinek, 2002; Reddy, 1999). Students needed to be actively involved in their education. Teachers needed to emphasize high expectations and the amount of time dedicated to a task. Traditional group work did not function in an asynchronous environment. Therefore, since students even in distance learning liked group work, courses needed to address novel solutions to asynchronous logistics.

More emphasis needed to be placed on the amount of timely interaction between student and teacher. In any course, but especially in distance learning, students counted on the teacher leading the course. Since distance learning was by nature isolating, timely feedback from the teacher lessened that feeling and promoted satisfaction for both teacher

and learner. Frequent and rapid interaction, beginning with a letter welcoming the student to the online course, made the student feel less isolated. Common complaints in unsuccessful programs focused on instructors' failure to return work and respond to questions in a timely manner. Students needed the validation that came from comments teachers wrote concerning homework, especially in distance courses that lacked other methods of learning validation. If the responses were delayed two or three weeks after submission, students may have been on a different topic and found difficulty relearning lessons. Delayed response made distance education less successful (Serwatka, 2002; Karber, 2001).

On the other hand, personal interactions could become too demanding. "Students in the online setting quickly become demanding, expecting instant feedback following their contributions. I once had to point out to a student complaining that nearly 48 hours had gone by without feedback, that in the face-to-face version of this course they only met once per week and that feedback took at least seven days" (Peterman, 2000, p. 31).

Technological glitches exposed yet another reason for prompt feedback. Students needed to know if the information was lost by the technology or ignored by the instructor. Especially with complex emerging technologies, lost messages were a common complaint (Karber, 2001).

Distance learning with high transparency allowed the instructor and the students to concentrate on the processes of teaching and learning. Teachers and students needed to interact on a personal level. Proper instruction prepared students and teachers for the intricacies of web-based environments. A voluntary orientation session introducing the

student to the use of the Internet and the course format helped promote transparency. The orientation session also helped students and teachers get to know each other (Thurmond, Wambach, & Connors, 2002).

When emphasis was placed on interactions, students moved toward attaining goals. Asynchronous communication allowed students and teachers to reflect before writing responses, revising their statements, and responding with well-phrased answers. These communications more than compensated for the lack of face-to-face contact. Courses where teachers and students posted their biographies and teachers initiated a phone call the first week of class had good success. Teachers and students were united by such activities as posting student work and communicating by synchronous and asynchronous discussions (Karber, 2001; Martinek, 2002).

Besides forging an intimate relationship with the teacher, building relationships with support personnel was also important. A sensed concern from the support personnel led to students feeling social presence. If students sensed concern from those at the college, the students perceived a high level of immediacy. If students felt concern, they felt closeness (Saenz, 2002).

Students' appreciation grew when their progress was assessed by a variety of methods. Two different opinions surfaced concerning the type of assessment appropriate in distance education. Serwatka (2002) found that immediate feedback by multiple-choice quizzes could be used with ease. Online computer-graded assessments provided students with quick feedback and helped them determine if they had mastered the material. Ten-question quizzes helped students study the correct material for the tests.

At least in that study the students found the quizzes invaluable. Others found automated multiple-choice exams distasteful and a trend toward standardized, mass produced, commercialization of education (Dibiase, 2000; Berube, 1998).

Conflicting evidence was found concerning the need to adapt pedagogy to distance learning in technical education. Markel (cited in Thurmond, Wambach, & Connors, 2002) denied that adapting pedagogy was even necessary when technical colleges adopted distance education. In technical education the main instructional method wasn't lecture but was helping students assimilate information and providing assistance with projects. Technical instructors' tasks consisted of reviewing and commenting on student work and keeping up in their technical field. Only lecturing was limited by distance learning media, and so the main activities of technical college instructors worked well in distance education.

Some practices contributed to difficulty in distance education courses (Uhlig, 2002; Darnell & McCrohan Rosenthal, 2001). To most students it seemed obvious that distance learning required access to a computer, modem, and a telephone line or to a cable connection and that students have keyboarding proficiency. Students who failed to acknowledge these basics faced difficulty in succeeding in their courses. Another misconception that could have been cleared up through an orientation session was the amount of work an online course required. Students mistakenly thought that distance learning courses would be easier. Some even thought they could increase their course load because of their perceptions. The mistaken perceptions produced minimal effort, resulted in a failure to keep on track, and ended in lower grades or dropping out. At the

orientation the teacher could point out that the tradeoff for the shorter time frame was increased intensity.

Instead of an orientation session, some schools increased student success by having students complete a pre-screening survey prior to entry into online courses. The online surveys were very similar to the one adopted at CVTC (Appendix E). Helping students make the decision that distance learning was not for them was the major advantage of a pre-screening survey. By means of probing questions in a survey format about learning styles and lifestyles, the learners could assess their time and commitment to the program to determine if distance learning courses met their needs (Peterman, 2000; Darnell & McCrohan Rosenthal, 2001; Beets & Lobingier, 2001; Schauer-Crabb, 2002).

Darnell & McCrohan Rosenthal (2001) started with a philosophy that said the school needed to foster good beginnings for a course. They tried things like contacting students on the first day of class. They determined such practices put the burden on the instructors and made the students passive in their education. It occurred to them that in a traditional class, students were required to be more active and responsible. After careful evaluation, they changed practices. Their research pointed out that students needed to accept responsibility for their education. When the students registered for the course, they received authentication confirming their registration and informing them of the course instructor.

The pedagogical techniques applicable to distance education were, in many cases, similar to effective traditional techniques. When necessary adaptations were made, learning was enhanced and both learners and instructors had increased satisfaction.

Summary

The review of distance education literature showed several common threads:

1. Students were successful distance learners when they were self-disciplined, goal-oriented, and active in their education.
2. Teachers were satisfied with providing a distance education when they formed bonds with their students and received technical support and administration backing from their college.
3. Distance education was provided through many media each with its own advantages and disadvantages.
4. Good distance pedagogy shared many traits with good traditional pedagogy. The successful distance education providers were those who found innovative ways to provide a comfortable learning space, excellent technical support, and appropriate timely feedback for their students.

Chapter III

Methodology

Research Design

The CVTC pilot study on different distance education media included many features common to good research. One advantage the pilot study had concerned a relatively unique possibility of data analysis. Since the same students were exposed to each of the distance media, comparisons could be made about the different media directly. Many studies in the review of literature compared different groups of students with just one media; thus those studies were unable to make comparisons about the effectiveness of any particular distance media (Martinek, 2002; Ryan, 2001; Schumm, 2003).

Another aspect of the CVTC study commonly incorporated in research was a control group. The control group was the set of students in the traditional classroom that the teachers in the study also taught concurrently with the experimental group. Logically, any differences in student attitude and performance between the traditional and experimental groups would have come from either differences in students or differences in teaching. Since the purpose of the study was to determine differences between traditional and distance teaching, it was necessary to show that any differences were not a result of exposing different students to the teaching methods.

The students in the study came from a diverse sample of the population of students at CVTC. Random selection of subjects in a study is traditionally used to

control for differences (Crowl, 1993). In educational research, such as the CVTC pilot study, forming random groups is often not feasible. When subjects are not randomly assigned in a study, the study is called a quasi-experimental study (Crowl, 1993). Quasi-experimental studies cannot be used to determine if two groups being compared are initially alike.

Statistical comparisons in quasi-experimental studies commonly analyze results using methods such as regression analysis, factor analysis, and correlations. In a study on web-based distance learning, the researchers used correlations and multiple regressions (Thurmond, Wambach, and Connors, 2002). The analysis techniques of the data collected in the pilot study focused on two areas: Were there any real differences between groups? and, What factors could have accounted for any differences?

Subject Selection and Description

The population studied was composed of instructors teaching and students taking XML-eXtensible Markup Language (XML), basic chemistry, and written communications classes at CVTC, Eau Claire, Wisconsin, during the spring semester 2004. XML represents three of the 36 possible credits a student can choose to fulfill the 18-credit component in programming for the Programmer/Analyst two-year associate degree. Basic chemistry is a prerequisite for many health-related, fire science, and agriculture programs. Written Communications is required in 34 programs ranging from accounting to wood techniques.

The sample of the population was composed of students enrolled in the three courses taught by the three pilot instructors. All of the students enrolled in those sections were sample subjects. A good experimental technique would be to inform subjects of their participation. When the pilot study was initiated, the TLC team had proposed that the students be informed at registration that the sections of the class they were taking were part of an experimental study. It was unknown why such a notification at registration did not take place.

Each semester CVTC offers 1600 course sections in about 40 different program areas. The sample had three courses of two sections each. The courses and sections taught were selected, in November, 2003, by the teacher recruited for the study. The selection criteria were that the course had to have two sections: one of them was a control group and the other section was the experimental group. Logistically, both criteria could not be met in the pilot study. Basic chemistry used an ITV course as its control group and XML used a web-based course management system as its control group.

The student population at CVTC was between 4000 and 5000 full time equivalent students in spring 2004. Students at CVTC registered for classes online. The available sections of each course were listed, and students selected which section to take. Their choices of selections were limited to the sections not yet filled. Students may have selected the experimental sections merely because no other sections were available.

The students in the experimental groups received a letter from the school on January 1, 2004 (see Appendix C). This letter explained the experimental study to the students. Since most courses were full by January 1, 2004, students may not have had the

option to change sections and not be part of the experimental study. Each of the pilot study instructors was to inform both the experimental group and the control group that they were the subjects of a study of course delivery methods.

For the pilot study, XML had five students in the experimental and control groups. Written communication had 19 students in the experimental group and 20 in the control group. Basic chemistry had 20 students in the experimental group and 26 in the control group.

As the semester went on, students dropped out of each course. Students didn't always follow official procedure, and thus it was difficult to determine if students officially dropped out or just gave up and quit coming to class.

CVTC has about 200 full-time instructors. The pilot study sample included only three of them. The three experimental study instructors were selected using the following procedure. In forming the pilot program instructor group, the TLC team tried to select teachers of various technological abilities. An initial request for volunteers did not get enough instructors to fill the pilot study. Recruits were then enlisted. The criteria for selection were: previous experience with distance education, specifically ITV, and a level of acquaintance with the web-based course management system. The pilot study instructors had between 20 and 30 years of teaching experience which was probably slightly more experience than the average CVTC instructor. The instructors had opportunity to ask questions of the TLC team during the recruitment. The instructors were considered to have given their consent when they accepted their appointment to the pilot study.

Variables

The independent variables in this study were: first, the delivery system used: ITV, IP-video conferencing, and a web-based course management system; second, the courses taught: written communication, basic chemistry, and XML; and third, experimental and control groups. The dependent variables in this study were student survey responses, instructor survey responses, and student grades. The survey items were coded with a alphanumeric code and key word code to ease reference to specific analyses in chapter 4 and 5. The alphanumeric code letter is *S* for *student* and *I* for *instructor*. The numbers correspond to the item number from the survey. So *S1* would refer to the first item on the student survey. Since the survey item asks about receiving materials, the keyword is *materials*. Table 3 lists the survey items, codes, and corresponding key words.

Table 3 *Survey Items with Code and Key Word*

Code	Survey Item	Key word
S1	The classroom environment provided a good method for me to receive my instructor's lecture information and/or class notes.	Materials
S2	The classroom environment provided easy access to course materials and/or documents.	Access
S3	The classroom environment allowed me to interact with other students.	Interact student
S4	The classroom environment included methods of instruction (e.g., lecture, discussion, worksheets) that allowed me to learn and apply information.	Methods
S5	I could use the classroom environment to interact with the instructor.	Interact teacher
S6	The classroom environment allowed the instructor to provide helpful and timely assistance and feedback to me.	Teacher help

S7	The classroom environment actively involved me in learning.	Involved
S8	The classroom had few or no technology interruptions that affected my learning.	Interruptions
S9	CVTC supported my learning through appropriate technology and technology-related student services.	Support
S10	Overall, the classroom environment created an effective learning environment.	Overall
S11	How important is it for you to have the option to take this course using distance technology?	Distance
S12	What was the location of the computer you used for this phase?	Location
I1	The delivery technology provided a good method for me to deliver my lecture information and/or class notes.	Delivery
I2	The delivery technology allowed me to easily and efficiently post course materials and/or documents for use during class or for independent use by students.	Post
I3	The delivery technology allowed me to conduct effective educational activities using group discussions and/or group work.	Group
I4	The delivery technology included methods of instruction (e.g. lecture, discussion, worksheets) that allowed me to teach the students effectively.	Methods
I5	The delivery technology allowed me to deliver all of my course content.	Content
I6	The delivery technology allowed me to communicate effectively with the students.	Communicate
I7	The delivery technology allowed me to provide appropriate assistance to students.	Assistance
I8	The delivery technology offered ample opportunity for me to interact with my students.	Interact
I9	The technology had few or no breakdowns that interrupted my teaching.	Interruptions
I10	CVTC provided me with good technology support.	Support
I11	Student achievement in this technology was about the same as it would be for this course content in a traditional class.	Achievement
I12	Student retention during this technology was about the same as it would be for this course content in a traditional class.	Retention

I13	Student satisfaction with the course content delivered in this technology seems about the same as it would be in a traditional class.	Satisfaction
I14	Overall, the delivery technology provided an excellent teaching experience.	Overall
I15	If given the choice, would you use this technology in the future to deliver your course?	Use
I16	If load for ITV is 7% per credit, the load for this technology should be ___ per credit?	Load

Media Utilized

The students in the sample were instructed via four media. The control group received instruction via one of the methodologies ordinarily used in the traditional classroom (see Appendix D). Students in a traditional classroom had additional access to the teacher during office hours. Students also may have received extra instruction in the study skills center, a work area staffed with certified teachers in math, science, and communications skills. Besides office hours, teachers allowed students other ways to communicate with them, such as e-mail or phone. The method of making contact was left to the discretion of the teacher and students.

Due to logistical problems, the control group for the basic chemistry class actually needed to be an ITV class. In that case, the instructor taught at each of three campuses at least once in the semester. The bulk of the instruction took place from the Eau Claire site. This logistical situation turned out to be fortuitous, since having an ITV class allowed analysis of the new capability of asynchronous access. The students receiving

instruction on the Eau Claire campus represented the ITV base section. Those on the other campuses represented the ITV remote section.

The control group for XML was an Internet section taught using a web-based course management system. These students represented the traditional web-based course management system section. This situation, too, was fortuitous, since it allowed an analysis of a course blending distance and current education technologies.

The instructors used the same curricula and similar syllabi for control and experimental groups. All other instructional procedures in the pilot study also were to be alike for both experimental and control groups.

For the experimental group, all three courses were to be taught using three media: ITV, IP video conferencing, and a web-based course management system. The ITV experimental portion used a commercial hardware and software product marketed by Polycom Corporation. Polycom is a hardware and software vendor that markets a product called Polycom Media Center. This product had a base station in two or more locations. People in any location could see and hear people in the other locations. This technology was used either synchronously or asynchronously. The usual use was synchronous, but if the students were unable to attend a session, they were encouraged to view the session via a digitally captured file. The disadvantage of the asynchronous viewing was a lack of teacher-student interaction. The asynchronous feature was an upgrade over previous ITV systems, which only had playback if a videotape was made of the class. The experimental group during this first section of the course was treated like an ITV remote location class. Just as in traditional ITV remote instruction, this group of

students was separated from the teacher so that they had to communicate via the ITV. Both groups also had intermittent visits from the teacher for direct instruction. The ITV experimental section was in the same building, whereas the ITV remote location was never in the same building.

The IP-video conferencing portion of the study used Centra. It is a software provider that makes a web-collaboration product called Centra 7. This product allowed voice, video, and computer software to be sent out to remote sites. Those at the remote sites were able to collaborate with the base provider using their keyboards. IP-video conferencing was used either synchronously or asynchronously.

The usual use of IP video conferencing was synchronous, but if the students were unable to attend a session they were encouraged to view the session via a digitally captured file. The disadvantages of the asynchronous viewing were a lack of teacher-student interaction and only hearing the audio portion of the session and not viewing the video portion if the teacher had originally used a web-cam.

The web-based course management system used in the pilot study was Blackboard. It is a web-enhanced or web-based content delivery tool developed by Blackboard Inc. Blackboard had tools that allowed instructor-student interactions in e-mail, computer applications, and chat-room type settings. Student projects were submitted in a number of different ways. Grading was also a component of the program. The method of instruction for the experimental group was the same as the current courses taught using the web-based course management system. The students in the experimental group had previous face-to-face interaction with the instructor and fellow students.

CVTC policy did not require face-to-face interaction with their web-based course management system.

The teachers were informed of the experimental procedure (see Appendix D). In the first week, the instructors were to use customary teaching methods. For weeks two through six, the students were in one room while the teacher was broadcasting via ITV. In order to have the study be as controlled as possible, instructors were informed not to go to the student classroom, but rather communicate with the class via the ITV and the usual communication methods. For weeks seven through 11, instructors delivered course material via IP-video conferencing. Students participated either in synchronous or asynchronous learning. The teachers again were limited to communicating via the media. Instruction for teachers in IP-video conferencing was given in the months preceding the beginning of the semester. For the final section of the course, weeks 12 to 16, instructors used the web-based course management system.

Instrumentation

During their first three years of employment at CVTC, instructors were required to administer student course evaluation surveys. The college's staff development team used the results of these surveys to help teachers improve their instruction. Since the college used the results of the survey for a purpose, the student survey had content validity. The attitude survey administered to the students was an adaptation of the student course evaluation survey used at CVTC. These attitudinal surveys had 10 to 12 statements. Respondents were to use a four point Likert scale where the response

strongly agree was coded four, *agree* was coded three, *disagree* was coded two, and *strongly disagree* was coded one.

The faculty survey was developed by the TLC team specifically for the pilot study. The same faculty survey was administered at the end of each trial section. The survey appeared to have face validity (Appendix B). In their summary to the CVTC administration, the TLC team reported the results of the teacher survey using the arithmetic mean of each question. They also reported any faculty comments, and stressed those they thought pertinent to the pilot study. The CVTC administration accepted the report of the TLC team which strengthened the argument that the faculty survey had validity.

At the end of each section of the pilot study, students and teachers completed a survey (see Appendix A and B). Throughout the pilot study, when a survey was presented to the experimental group, it was also presented to the control group. The method of administering the student survey to the experimental group differed for the second and third sections of the course. Since the students were not present in a classroom, the experimental group received the surveys in the mail. Only the surveys returned by the students were analyzed. The traditional group continued to receive their surveys in class. Only surveys of students in attendance on the day the survey was administered were analyzed. Administration to the control group remained the same throughout the study.

During each of the trial sections, the instructors were to administer some form of testing and determine a student grade for that media. The testing procedure was the same for both experimental and control groups.

Data Collection Procedures

The TLC pilot study developed and administered the teacher and student surveys. They made the selection of criteria, students, instructors, evaluation instruments, and methodology. The TLC team responsible for the pilot program gave permission for the information they gathered to be used for this study. This study will statistically analyze and evaluate the data collected in the pilot study.

The TLC collected several types of data at the end of each media trial: teacher and student surveys and student test and grade data. CVTC procedure required that the teacher not be present when the student survey was administered. A member of the TLC team administered the survey to the students. The students were not identified on the survey, so limited comparison could be made between student achievement and satisfaction. The grade data consisted of student grades and test results.

Student and faculty participation was voluntary. The test scores and grades could be compared for each student, course, and medium. The research was conducted with the approval of the college academic dean. All of the information that could be used to identify students or instructors was removed from the data sheets before being transferred to this study. The student achievement data were assigned random numbers when the

pilot study data sheets were transferred to this study. These numbers were used only to help analyze the data.

Procedure Followed

The research data for this study were paper copies supplied by the TLC team. The data were keyed into the computer program Statistical Program for Social Sciences (SPSS), version 12.0. The data consisted of 475 cases distributed among 74 variables. Student satisfaction was analyzed with 10 direct variables from the student survey (Appendix C). An additional student satisfaction variable was calculated by taking the average score of the 10 direct variables. Instructor satisfaction was analyzed with 15 direct variables from the instructor survey (Appendix B). An additional instructor satisfaction variable was calculated by taking the average score of the 15 direct variables.

Data Analysis

Student and teacher satisfaction were analyzed using a conversion from the Likert scale to a numeric scale. The means of those converted data were used to report satisfaction. An argument could have been raised that Likert scale data were not ratio data. The argument would be that one had no way of determining if the differences between each of the choices in the survey scale were the same. Since reporting means on a Likert scale was the common method of analyzing survey data at CVTC, it was assumed that, at CVTC, survey data were ratio data.

One aspect of the data collected in the pilot study required specialized analysis techniques. The section sizes were originally to have about 27 students each. XML did not come close to that number for either of its sections. Because of the greatly different section sizes, it was possible that parametric tests (those that assume the data follow certain specific rules) would not produce significant results. When data doesn't follow those rules, non-parametric tests are used.

Parametric and non-parametric tests differ greatly. Parametric analyses are useful when the data are normally distributed and scalar in nature. Non-parametric analyses are robust (useful) when data are not normally distributed, when differences between data points are not even, and when sizes of groups differ greatly. Non-parametric tests use statistics such as the median to compare data sets. One particularly robust non-parametric statistic used to compare groups is Kruskal-Wallis (SPSS, 2003).

SPSS was used to analyze the data. The first analysis was of the descriptive statistics for each variable. While such an analysis was not sufficient to show that a variable was normally distributed, it could show a variable was not normally distributed. Normally distributed data followed the bell-shaped curve. Sometimes distinguishing normally distributed data was difficult. Data was usually normally distributed if the numerical median and mean were approximately equal, the skew (asymmetry of the bell-shaped curve) was small, and the kurtosis (height of the edges of the bell-shaped curve compared to the middle) was small (SPSS, 2003).

Eleven variables from the student survey were used to analyze student satisfaction. The arithmetic mean and median compared commonality of responses by

the students to the various questions. Students' responses were also averaged into a separate variable to get a view of the overall survey response scores. The standard deviation of the 11 variables showed how the survey data were dispersed among the different Likert-scale responses (SPSS, 2003).

Next, the means and medians calculated previously were compared. ANOVA tests were used to compare means and Kruskal-Wallis analysis was used to compare medians. When analyzing means and medians, the statistical probability (p) was used to help decide if any calculated difference was real or related to chance. A statistical probability close to 1.00 or -1.00 indicated that the differences were related to chance. A significance score close to 0.00 indicated a small probability that the differences were related to chance. Statisticians use this small probability to imply a large probability that the differences were real (SPSS, 2003).

The analysis compared satisfaction to instructional method, control or experimental group, and course. The differences in means and medians were analyzed to determine if any differences were real or related to sampling techniques.

The number of survey items and students surveyed resulted in a large quantity of data. Simplifying the data in order to more easily find real differences was the next statistical goal. By comparing variance of the means of the responses, factor analysis often could effectively reduce the number of pertinent components to consider. In factor analysis, the important statistics to consider were the communality of variance scores before and after rotation. Component communality scores close to 1.00 indicated the variable accounted for a large amount of the variance in student survey responses. This

type of factor analysis answered the question: “How many components represent the data?” (SPSS, 2003).

When a large amount of data on a closely related area is collected, factor analysis can also help determine how the variability in student responses related to their level of satisfaction. In the case of the pilot study data, factor analysis was able to account for differences among student responses. If students usually responded to each question the same way, correlation among the survey items increased. But, if students’ responded differently to certain items, factor analysis was able to find that variability. This type of factor analysis determined the amount variability in responses. That variability differed when considered from more than one perspective. The different perspectives are called rotations in statistics. This type of factor analysis answered the question: “What do the components that were gathered from the data represent?” (SPSS, 2003).

The analysis of instructor satisfaction was very similar to student satisfaction except for one point. In the experiment, a different set of students served as the control group while another set served as the experimental group. The instructors taught both groups. Since the instructors didn’t complete a separate survey for their traditional classes, no comparisons could be made for instructor satisfaction.

The arithmetic mean of student grade scores would indicate commonality of achievement for each condition (group, course, and technology). The standard deviation would indicate the amount of dispersion of those grade scores for each condition. The statistical comparisons of medians and means yielded the same type of information for grade data as it did for student and instructor satisfaction.

An additional statistical analysis could be made with the grade data, since the individual students could be matched with a grade during each of the three sections of the course. The first method of correlating grades was a *t*-test. This analysis resulted in a statistic measuring significance that related *t* scores and degrees of freedom. SPSS by default measures two-tailed comparisons. This default was selected, since it was not known whether grades would be better or worse for each section. A two-tailed significance close to ± 1.00 indicated a high probability that differences were related to chance. On the other hand, a significance score close to 0.00 indicated a low probability that differences were related to chance; thus it was highly probable that any differences were real.

Another comparison of means used was the one-way ANOVA. This analysis tool was able to determine if any differences among the means of the variables indicated any significant relationships. The statistical procedure used when determining relationships after the experiment was called post hoc analysis. The statistic most often used for post hoc analysis was Tukey's HSD. If a mean was significantly different, Tukey's HSD helped determine which means were different and in which direction that difference lay (SPSS, 2003).

In addition to the numeric data, students and instructors could enter comments on their surveys. Since comments were not required, analyzing them statistically was not considered as important as reading them. The comments were categorized by instructor, method, and group. Each comment was classified as *dissatisfied* if the item upon which the comment was based was scored as *strongly disagree* or *disagree*. Each comment was

classified as *satisfied* if the item upon which the comment was based was scored as *strongly agree* or *agree*. The verbal responses were recorded in Appendix F.

Limitations and Assumptions

The students had opportunity to withdraw from the study if they wished. The teachers were not selected randomly, but were pre-selected by the TLC team. The teachers decided which course would be part of the study.

The students in the sample were regularly enrolled in continuing education or credit courses. They were assumed to represent the population of students at the college. Thus, their course grades and survey responses were assumed to be honest representations of the appropriate data.

The order in which the media were trialed was assigned by the TLC team. This may have influenced any of the dependent variables.

The instructors did not complete surveys for their control sections and thus instructor satisfaction could not be compared between control and experimental groups.

Chapter IV

Results and Analysis

The data collected on the pilot study by the TLC team formed the basis for this study. That data was analyzed according to the procedures outlined in chapter three. The experimental results were statistical calculations of the raw data supplied by the TLC team.

The results were reported using the objectives of the study from chapter one as the outline. The first objective was to study the relationship of student satisfaction among the technologies, methodologies, and groups of the pilot study.

All ratio variables were found to be normally distributed. The Likert data was analyzed with standard statistical methods, since CVTC regularly uses parametric statistics with their survey evaluations.

Student Satisfaction

Ninety-eight students initially enrolled in the classes studied. The students were to complete three surveys. Due to drop outs and non-participation in the surveys, only 188 surveys were returned – a 64% response rate. There were 11 student satisfaction variables. The Likert responses were coded numerically: 4 *strong agreement*, 3 *agreement*, 2 *disagreement*, and 1 *strong disagreement*. Analysis produced scores with means that ranged from the lowest for S10 (Overall, $\bar{x}=2.81$) to the highest for S2 (Access, $\bar{x}=3.06$). The least dispersion as measured by standard deviation was for S9 (Support, $\sigma=0.67$), the greatest dispersion for S3 (Interact students, $\sigma=0.89$).

S10 (Overall) was the student survey item, "Overall, the classroom environment created an effective learning environment." The score ($\bar{x}=2.81$) indicated that the students' level of agreement with the survey item was closer to *agree* than *disagree*. The survey level exactly between *agree* and *disagree* would have been $\bar{x}=2.50$. S2 (Access) was the student survey item, "The classroom environment provided easy access to course materials and/or documents." The score ($\bar{x}=3.06$) indicated that the students' level of agreement with this survey item was just slightly above *agree*.

If the students had chosen each of the 4 Lickert scale levels of satisfaction equally, the standard deviation would have been ($\sigma=1.29$). Compared to equal choices, the students' levels of satisfaction would be more localized around the average value if the standard deviation were less than 1.29 and more dispersed if it were greater than 1.29. S9 (Support), was the student survey item, "CVTC supported my learning through appropriate technology and technology-related student services." The standard deviation ($\sigma=0.67$) indicated that with the average ($\bar{x}=2.96$) 68% of the students would have answered somewhere between slightly higher than *disagree* and slightly lower than *strongly agree*. The small range of standard deviations indicated that even the most dispersed variable, S3 (Interact students), the student survey item, "The classroom environment allowed me to interact with other students." ($\sigma=0.89$) still would have had students who answered somewhere between slightly higher than *disagree* and slightly lower than *strongly agree*.

Factor analysis scores were used to reduce the number of variables. One component accounted for 66% of the variance in student survey responses. If there were

a theoretical survey item that combined all the ideas in the survey (component), it would account for 66% of the variance of the student responses. The component matrix revealed that the highest component score was for S10 (Overall, $r=0.894$). S10 was the survey item that came closest to the theoretical survey item. None of the survey items was discriminating enough to account for a significant amount of the remaining 34% of the variance in student responses.

The value of having only one significant component was that an effective analysis of the data could be made by looking at the results of just one survey item. The survey item chosen would be the one that came closest to being measured by that component. While all the survey item scores were calculated to simplify comparison, only the scores for the variable indicated by the factor analysis S10 (Overall) were reported. Table 4 compared the mean satisfaction scores and standard deviations for the different variables.

Grouping by instruction method gave the greatest resolution to the students' level of satisfaction. The greatest satisfaction and variability was with IP-video conferencing ($\bar{x}=2.00$ $\sigma = 1.10$). These values indicated that the students learning via IP-video conferencing were on average dissatisfied. Since they couldn't have answered worse than *strongly disagree* the dispersion had a statistical skew toward greater satisfaction. In fact, of the 16 students who completed surveys after learning via IP-video conferencing, 7 voiced great dissatisfaction, four were dissatisfied, three were satisfied and two were greatly satisfied.

By contrast surveys indicated high levels of satisfaction ($\bar{x}=3.45$ $\sigma = 0.55$) among a large portion of the students being taught in the traditional classroom. Of the 38

students returning surveys in the traditional classroom, 19 were greatly satisfied, 18 were satisfied, one was dissatisfied, and no one was greatly dissatisfied.

Table 4 *Comparison of Student Satisfaction with Different Variables*

Variable (Sig.)	Type	Mean	Standard Deviation
Instruction method *	IP-Video Conferencing	2.00	1.10
	ITV experimental	2.36	0.86
	Blackboard	2.56	0.88
	ITV Base	3.04	0.68
	ITV Remote	3.12	0.67
	Traditional	3.45	0.55
Course **	XML	3.44	0.62
	Written Communication	2.84	0.99
	Basic Chemistry	2.65	0.83
Group *	Control	3.26	0.63
	Experimental	2.24	0.87

* ($p = 0.000$) ** ($p = 0.002$)

Instructor Satisfaction

Three instructors were involved in the study. Each instructor had the opportunity to complete three surveys. Seven surveys were returned – a 78% response rate. There were 16 instructor satisfaction variables. The Likert responses were coded numerically: 4 *strong agreement*, 3 *agreement*, 2 *disagreement*, and 1 *strong disagreement*. Analysis produced the lowest mean score for I3 (Group, $\bar{x} = 2.17$) and the highest mean score for I10 (Support, $\bar{x} = 3.57$). Dispersion scores for instructor satisfaction were higher than they were for student satisfaction partly because there were fewer cases. The least

dispersion was for I9 (Interruptions, $\sigma = 0.76$); the greatest dispersion for I8 (Interact, $\sigma = 1.40$).

I3 (Group) was the instructor survey item, “The delivery technology allowed me to conduct effective educational activities using group discussions and/or group work.” The analysis indicated that, on average, the instructors disagreed with the survey item—they were not satisfied with the levels of group activities allowable by the experimental technologies. I10 (Support) was the instructor survey item, “CVTC provided me with good technology support.” It had survey responses that indicated the instructors *agreed* or *strongly agreed* that CVTC offered good technology support.

With seven surveys and four possible responses to each item, 1.60 was the greatest possible theoretical value for the standard deviation. I8 (Interact) was the instructor survey item, “The delivery technology offered ample opportunity for me to interact with my students.” The instructor responses to this survey item differed greatly. In fact, the instructors strongly disagreed with this statement three times and agreed or strongly agreed with it twice each.

Factor analysis scores were used to reduce the number of variables. Three components accounted for 93% of the variance in instructor satisfaction. The greatest amount of variance was for I1 (Delivery, 63%, first rotated component $R = 0.914$). The second greatest variance was related to I6 (Communication, 20%, second rotated component $R = 0.988$). The third greatest variance was tied to Variable I12 (Retention, 11%, third rotated component $R = 0.930$).

The factor analysis pointed to the importance of these three components in further analysis. When the means of the variables were compared for the different learning methods, the two rotated variables, I6 (communication, $F= 0.939, p= 0.463$) and I12 (retention, $F= 0.649, p= 0.570$), did not have statistically significant variances. Thus, the only variable considered for instructor satisfaction was I1 (Delivery, $F= 12.857, p= 0.018$). Comparing instructor satisfaction to course taught using I1 revealed no significant variance. When grouped according to course, the least random of the three variances was I1 (Delivery, $F= 0.229, p= 0.805$).

These results indicate that instructor satisfaction would have been difficult to analyze using fewer than four components. Even if one would have been able to determine those four components, only one survey item, I1 (Delivery), would have had a significant match with the extracted component statistically significant results. For that variable, most of the variability in instructor responses was related to chance.

Factor analysis did not reveal significant components affecting instructor satisfaction (communality after 25 iterations <1).

Student Grades

Out of 294 possible student grades, 274 were recorded. The grade data accounted for 93% of the possible grade scores. The other 7% of the grade data were probably not recorded because students either officially or unofficially dropped out.

The grades were coded so that the data would be numeric. The letter grade and its numeric equivalent were: *F*, 0.00, *D-*, 0.33,.... *A+*, 4.33. The lowest reported grade was

$F(0.00)$. The highest grade was $A+$ (4.33). The average score was 1.74 (about a $C-$; $\sigma = 1.44$). Thus, about 68% of the grade scores were between $D-$ and $B+$. The grades earned by the students approximated a normal curve centered at $C-$.

The grades were next analyzed by comparing grades earned to the course. Any difference in means may have been discovered with the ANOVA procedure. The *between group significance* ($p=0.89$) revealed that chance accounted for 89% of the variation in achievement scores when compared by courses. The grade data was normally distributed and scalar, but there were fewer students in XML than the other two courses. Kruskal-Wallis was a particularly appropriate non-parametric statistic to use to analyze differences in grades based on course, because of the large differences in numbers of students in the classes. The more robust Kruskal-Wallis statistic revealed a 90% probability that chance accounted for the variance in grade data (Chi-squared = .213 $df=2$ sig= .899). No further analysis of the variation in means was computed due to the large amount of variance that was accountable by chance. The grade data when analyzed by course showed that no course grades deviated from the normal curve represented by the entire grade data set.

Using parametric ANOVA statistics revealed that chance accounted for less variation for the other two variables: instruction type and group. Those results are found in Table 6. The highest average grades were earned by the ITV experimental group ($\bar{x} = 2.36$). They also had the greatest standard deviation ($\sigma = 1.57$). The grade data for the ITV experimental group could be interpreted as an average letter grade of $C+$ and 68% of the grades between $A+$ and $D-$. Such a large standard dispersion of grades may indicate a

bimodal distribution. In this case, of the 41 student grades from students learning via experimental ITV, there were 17 *B*'s and 13 *F*'s. Students either had above average achievement or failed while learning via the experimental ITV. The lowest grades and least dispersion were earned by students learning via the ITV Remote technology ($\bar{x} = 1.06$ $\sigma = 1.07$). These scores correspond to a *D* average with 68% of the grades between *C* and *F*. Since the standard deviation was larger than the average, the grades must have been skewed toward the lower end. In fact, of the 48 grades earned by students learning via ITV Remote, 21 were *F*'s.

Separating into control and experimental groups revealed significant differences in grade data. The experimental group had both higher grades ($\bar{x} = 2.18$) and greater dispersion ($\sigma = 1.51$). These results indicate that experimental students had an average grade between *C* and *C+*. With such a large standard deviation, a good possibility exists that the data were bimodal. In fact, of the 123 grade data for the experimental group, 29 had *F*'s and 32 had *B*'s. The control group ($\bar{x} = 2.18$, $\sigma = 1.51$) had a *D+* average. Once again, the data were bimodal. Of the 156 grade data for the control group, more than one-third failed. Another third was clustered between *C+* and *B*. In each case, between one-third and one-fourth of the students received failing grades.

Table 5 *Comparison of Student Grades and Instruction Method*

Variable	Type	Mean	Standard Deviation
Instructional Method *	ITV experimental	2.36	1.57
	IP-video conferencing	1.95	1.42

	Traditional	1.79	1.37
	Blackboard	1.47	1.57
	ITV Base	1.49	1.15
	ITV Remote	1.06	1.07
Group *	Experimental	2.18	1.51
	Control	1.38	1.27

* ($p = 0.000$)

The statistical analysis of grade data included t -tests, because the grades of each student were recorded in a way that allowed comparison between sections of the semester. The mean grade decreased as the semester progressed (2.24, $\sigma = 1.45$, $p = 0.000$; 1.65, $\sigma = 1.41$, $p = 0.000$; and 1.32, $\sigma = 1.40$, $p = 0.000$). As the semester progressed, the average grade fell from a $C+$ to a $C-$ to a $D+$. The number of failing grades increased from 16 to 32 and ended with 37.

The grade data were somewhat more robust than the survey information. The grade data could be linked to a particular student. A large amount (89%) of the variance when grades were compared by course would be attributed to chance (ANOVA *between group sig.* $p = 0.893$). Because of the high chance probability, differences in means for course taught are not included in Table 7. When the grades were split by the other two variables (group [control or experimental] and instructional method), the results revealed significant differences which are related in Table 7. The gap between the experimental and control groups remained about a full letter grade as the semester progressed (difference = 1.01, 0.76, 0.99). Over time, both groups gradually received lower grades. By the end, the control group average ($\bar{x} = 0.87$) was $D-$. The total grade drop in each

group was about a full letter grade (difference for experimental = 0.93 difference for control = 0.91). The biggest drop for the experimental group was between the first and second sections of the semester when the IP video conferencing technology was used. The grade drop for the control group was about the same for each period (difference = 0.48 vs. 0.43).

The comparison by technologies gave data that would have limited interpretive value. For example, the average for the students learning via the web-based course management system was zero for the first two sections and rose to 1.67 for the last section of the semester. The population of the group changed when the experimental group used the web-based course management system during the third part of the semester. Another example was that the traditional group by technology represented only the written communication students since their group was the only control group receiving traditional instruction. The data are presented in Table 7.

Table 6 *Comparison of Student Grades and Semester Section.*

Semester section	group	Mean	<i>p</i>
First	Experiment	2.79	0.000
	Control	1.78	
Second	Experiment	2.06	0.007
	Control	1.30	
Third	Experiment	1.86	0.000
	Control	0.87	
First	Traditional	2.24	0.000
	ITV Remote exp.	2.79	
	Web-based	0.00	

	ITV Remote cont.	2.10	
	ITV Base	1.5	
Second	Traditional	1.77	0.004
	IP-video conferencing	2.07	
	Web-based	0.00	
	ITV Remote cont.	0.96	
	ITV Base	1.43	
Third	Traditional	1.15	0.003
	Web based course management	1.67*	
	ITV Remote cont.	0.71	
	ITV Base	0.93	

* calculated from 2 groups

Post Hoc tests revealed that grades for the web-based group during the first part of the semester was significantly lower (Tukey's HSD, $p < 0.01$) than all groups except those in the traditional ITV classrooms. During the remainder of the semester, while the overall means differed, none of the differences either below or above that mean were significant. Post Hoc tests were not necessary when analyzing group membership, since there were only two groups (control and experimental). The control group mean (1.37, $\sigma = 1.28$) was significantly lower ($p = 0.000$) than the experimental group mean (2.18, $\sigma = 1.51$).

The verbal responses were quite extensive. The verbal responses from the subjects of the surveys are presented in Appendix F. Those responses which were relevant to the study questions are included in the appropriate section of the discussion in chapter five.

Chapter V

Summary, Conclusions and Recommendations

Summary

CVTC has joined the ranks of educational institutions offering distance education. One college goal is to increase the number of distance learners. To assist in reaching that goal while providing a suitable education, CVTC commissioned a pilot study designed to compare different methods of providing distance education. Among the areas that CVTC considered important in their pilot study were student and instructor satisfaction and student achievement. Three different modes of providing instruction were part of the study: ITV, IP-video conferencing, and a web-based course management system.

Students and faculty members were recruited as subjects of the pilot study. Over the course of the spring 2004 semester, each of the three distance technologies was studied for an equal amount of time. The goal was to measure student achievement and student and instructor satisfaction by using three distance-delivery methods and the traditional classroom method. As a control, sessions from each course were taught using traditional classroom methods. The same course was taught by the same teacher to an experimental section and to a traditional classroom section. There were six sections: the basic chemistry experimental section, the basic chemistry control section, the written communications experimental section, the written communications control section, the XML experimental section, and the XML control section. This study hoped to clarify for

students, teachers, and CVTC the results of the pilot study and their impact on a basic question — How well do different course delivery methods meet academic needs?

Seven different research questions were part of the analysis of the data. The questions focused on three different aspects of each of the areas considered: Did different technologies produce different amounts of satisfaction and achievement? Were those levels of satisfaction related to statistically discernable areas? and Were there any differences in student achievement, either between methods or courses?

The review of distance education literature showed several common threads in distance education. Students were successful distance learners when they were self-disciplined, goal-oriented, and active in their education. Teachers were satisfied with providing a distance education when they formed bonds with their students and received technical support and administration backing from their college. Distance education was provided through many media, each with its own advantages and disadvantages. Good distance educational pedagogy shared many traits with good traditional educational pedagogy. The successful distance education providers were those who found innovative ways to provide a comfortable learning space, excellent technical support, and appropriate timely feedback for their students.

The CVTC pilot study on different distance education media included many features common to good research. The students in the study came from a broad range of the population of students at CVTC. Since the same students were exposed to each of the distance media, comparisons could be made about the different media directly. The

control group was the set of students in the traditional classroom that the teachers in the study also taught concurrently with the experimental group.

The independent variables in this study were: first, the delivery system used: ITV, IP-video conferencing, and a web-based course management system; second, the courses taught: written communication, basic chemistry, and XML; and third, experimental and control groups. The dependent variables in this study were student survey responses, instructor survey responses, and student grades.

The instructors used the same curricula and similar syllabi for the control and experimental groups. All other instructional procedures in the pilot study also were to be alike for both experimental and control groups. At the end of each section of the pilot study, students and teachers completed a survey. During each of the trial sections, the instructors were to administer some form of testing and determine a student grade for that medium. The testing procedure was the same for both experimental and control groups.

The data were keyed into the computer program Statistical Program for Social Sciences (SPSS), version 12.0. The data consisted of 475 cases distributed among 74 variables. Student satisfaction was analyzed with 10 direct variables from the student survey. Instructor satisfaction was analyzed with 15 direct variables from the instructor survey. The arithmetic mean of student grade scores would indicate commonality of achievement for each condition (group, course, and technology). The standard deviation would indicate the amount of dispersion of those grade scores for each condition.

There were 11 student satisfaction variables. Analysis produced scores with means that ranged the lowest for S10 (Overall, $\bar{x}=2.81$) to the highest for S2 (Access,

$\bar{x}=3.06$). Factor analysis scores showed that 66% of the variance in student survey responses was related to one component, which was aligned with the survey item that considered overall satisfaction. When the variable for method of instruction was considered, the highest mean student satisfaction was for the control group receiving traditional instruction. The lowest mean was for those using IP-video conferencing. When the variable for course was considered, the highest satisfaction was for XML and the lowest for basic chemistry. The students in the control group were considerably more satisfied than those in the experimental group.

Including a calculated average, there were 16 instructor satisfaction variables. Analysis determined the lowest mean score for I3 (Group; $\bar{x} = 2.17$) and the highest mean score for I10 (Support; $\bar{x} = 3.57$). Factor analysis scores were used to reduce the number of variables to three. Only the survey item asking if the method allowed instructors to deliver their material had differences that were not highly related to chance. The instructors were least satisfied with the IP-video conferencing technology.

The grade data accounted for 93% of the possible grade scores. The grades were analyzed by comparing grades to the course. No differences in achievement scores were found when comparing different courses. The experimental ITV group had the highest achievement scores. The control group that used ITV from the remote site had the lowest achievement scores. The experimental group had significantly higher student achievement than the control group.

Limitations of the Study

The following limitations of the study are noted:

1. An initial request for volunteers did not produce enough instructors to fill the program. Therefore, the pilot study instructors were not randomly selected. Instead, the TLC team tried to select teachers of various technological abilities. The criteria for selecting instructors were that they should have previous experience with distance education, specifically ITV, and that they should have taught web-based courses.
2. The pilot study students were also not randomly selected. The school ran the study using its usual registration strategy. Thus, there was no opportunity to neither sample randomly nor assign groups for students participating in the study. A study in which participants are selected randomly is experimental. Since the teachers and students were not randomly selected, the study was quasi-experimental rather than a pure experiment (Gillett, 2004).
3. The sample size of instructors, courses, and students was insufficient for predictive statistics (Gillett, 2004). CVTC has hundreds of full-time and adjunct instructors teaching several hundred courses to several thousand students (CVTC, 2003). A sample of three faculty members, three courses, and less than 100 students is not large enough to formulate predictive statistics that would be applicable to the population of all students, faculty, and courses at CVTC.
4. Only seven instructor surveys were returned. One instructor only returned one survey. Factor analysis requires at least three variables that have separate

variances. The data for instructor satisfaction by course and by instructor was identical. The identical data resulted in an identity matrix when the analysis was made. Factor analysis can only be made of matrices that are not identity matrices. The only ratio data were grades, student satisfaction, and instructor satisfaction. Factor analysis determines relationships among data that are ratio. Factor analysis couldn't analyze comparisons between courses or technologies. Those comparisons could only be made using means and student comments.

5. The study guidelines allowed instructors to break from the study if they felt student success was falling. During the IP-video conferencing session, about a third of the written communications class asked the instructor to meet as a regular class since they didn't think they understood the material while using the technology. For the rest of that technology's time, the students could meet with the teacher during the Webcast presentation for the rest of the students. During the web-based course management system portion of the study, both written communications and chemistry instructors had traditional sessions that students could attend if they wished. About a third of the students in each class attended the traditional sessions.
6. The entire traditional web-based course management system section of XML dropped the course. Their scores were reflected in the study data. While an entire section dropping a course is troubling, analysis of the grades when all failing scores were not considered still showed significantly higher scores for the experimental group.

7. The regular ITV classrooms at CVTC have a microphone for each student. In the pilot study, those classrooms were not available. The alternative setup involved a temporary conversion of a regular classroom for ITV purposes. Originally, only one microphone for the classroom was provided. Later, a second microphone was added but the microphones had to be placed near the receiver because the cords were short. Audio was not the only area with shortcomings. In their surveys, the instructors talked about an inability to see the entire class using the ITV experimental technology. Of the 51 student comments concerning technology, 34 were negative. Of the 23 comments about experimental ITV, 14 concerned the failure of the microphones to pick up the student voices so that the instructors could hear. The instructors echoed these comments. The use of the temporary setup may have contributed to the rating for the experimental ITV student satisfaction being lower than their ITV remote counterparts.
8. Factor analysis was unable to extract a second factor influencing student satisfaction. It is entirely possible that the reason extraction failed was related to the student responses to technology (S8, Interruptions). For example, of the 14 students who responded that the sound quality in the ITV experimental group was problematic, three inexplicably chose *agree* or *strongly agree* to the survey item: *The classroom had few or no technology interruptions that affected my learning.* If students truly believed that their education was compromised by the poor sound quality of the ITV technology, why did they say they were satisfied with the

number of interruptions it caused? When technologies are installed, care must be taken so instructors and students can communicate.

9. The XML instructor and one of the XML students, in commenting on the experimental ITV system, found difficulty viewing the screen. Perhaps the level of resolution necessary for that particular course was more than the system was able to provide. No students in the other courses found difficulty in viewing the screen. One aspect to consider when matching courses to technologies is the ability to adequately present the educational material.
10. One type of comment from students reinforced an initial concern of the instructors: Were the students willing participants in the study? Even before the pilot study began and throughout it, two instructors commented that the students were uneasy with their participation in the pilot study. "I heard from my students that a few of them liked Centra, but the vocal core group hated it. Part of the problem was that students intentionally *enrolled* for a 'traditional' class and then ended up with a distance class."

A student wrote, "If I had known this from the beginning, I would have taken a different class with an instructor right in the class with me!" Did the knowledge that the teacher was in the same building as the students cause the students to feel they were victims of an experiment? A written communication student wrote, "If I had been aware (or even asked) that I was being made a guinea pig out of I would never have taken this course." The observations in this and the previous paragraph point to the failure of CVTC to adequately inform the participants of

the experimental nature of the class in which they were enrolled.

Student comments support a contention that the study results were compromised by a lack of informed consent for the students. The second highest rating for student satisfaction came from the ITV remote group. This technology was essentially the same as ITV experimental. In both cases, the teacher was in one place communicating with interactive TV while the students were in another place. Perhaps the anomalous data for the different ITV groups were related to comments from the students that expressed frustration being in the experimental group.

11. Previous research showed that students who were satisfied (and succeeded) at distance education, wanted to learn that way. The criteria for registering for the pilot study did not include notification that the course was being offered via distance education nor did any of the course names and numbers match those designated for distance education. It is impossible to determine the level of influence that failure had on the relative satisfaction and achievement in the distance technology. At the very least, students who were willing participants should have had higher satisfaction and perhaps equal or higher achievement.

Conclusions

The pilot study analysis of data gave evidence to consider for the research hypotheses. The research objective and hypothesis are listed first in each section. The conclusions based on the data follow.

Research Question #1. How satisfied are students with the quantity and quality of teacher-student interaction via each distance-education method?

Hypothesis: Students will be generally satisfied with the interactions for each of the course delivery methods.

The data analysis does not support the hypothesis that students will be generally satisfied. If the traditional classroom statistics reflected general student satisfaction at CVTC, then the students in the distance learning environments were not as satisfied as their traditional course counterparts. The traditional group had a mean satisfaction of 3.45, whereas the experimental group satisfaction was 2.24 (sig. 0.000). The only students in the traditional classroom group were those in written communication, since the other two control courses were forms of distance education methods. The statistics were such that chance accounted for less than 0.001. The distance education satisfaction could be interpreted as a slight dissatisfaction if 2.5 were considered the dividing line between satisfaction and dissatisfaction. The traditional students were between satisfied and very satisfied with their experience if 3.5 were considered the dividing line between those choices.

The student comments indicated sources of some of the variance in student satisfaction. Only 10 of the written comments were from the traditional class. Of those comments, only one was negative: a student didn't think the class was interesting enough. The other 264 written comments came from the experimental group.

All instructors commented on the need to interact. The pilot instructors seemed to rely less on lecture as a method of instruction and more on interaction. IP-video conferencing didn't satisfy the instructors' level of interaction. One wrote, "I could deliver my lectures, but I didn't have as much discussion. I try to engage students during the lecture."

It was difficult to interpret whether levels of satisfaction for instructors and students concerning interaction were caused by a personality trait or by an academic need to interact in ways, such as peer editing, instructor coaching, and instructor cheerleading. The pilot study students commented about the need to interact with their peers and teachers. Of the 55 comments written about interactions, either with fellow students or instructors, 39 made the comment after answering the survey item either *disagree* or *strongly disagree*. The greatest number of those negative responses came from the ITV remote group (30). As a group, the negative responses varied in severity from one XML student, who stated, "Technology had no effect," to another, who stated, "I HATED this! ... I am so frustrated to have been made to take this class!"

Research Question #2. How does student satisfaction among the three distance-education methods and traditional classroom compare?

Hypothesis: Students in the traditional classroom will be more satisfied with the effectiveness of their education than those using the distance delivery methods.

Students are familiar with traditional classrooms, and it seems reasonable that this familiarity will be satisfying to the students. Students will give positive

evaluations for the flexibility in time commitments which the asynchronous delivery methods provide.

The data analysis support the first part of the hypothesis that students in the traditional classroom ($\bar{x} = 3.26$) will be more satisfied than the distance learning students ($\bar{x} = 2.24$). These results are statistically significant ($p = 0.000$). The statistics also point to the most satisfaction for students in the ITV remote site class (3.45) and the least satisfaction for students using the IP-video conferencing technology (2.00). All of the experimental technologies had significantly lower satisfaction ratings than the control group.

The other part of the hypothesis specifically addressed the flexibility of asynchronous delivery methods. The responses did not reveal a difference between data that could not be accounted for by chance alone ($p = 0.278$). The comments concerning convenience of asynchronous learning were equivocal also. Of the 18 comments students wrote addressing the convenience of using the technology from home, 11 were written by students who disagreed with the previous statement on which they were commenting. Some of their comments seemed positive. A chemistry student commenting on the web-based course management system section of the course wrote, "I think that distance learning is a GREAT option!" Another chemistry student appreciated the ability to view ITV sessions asynchronously. "It doesn't inhibit interaction with students outside of class, but there is less need to attend class." The majority of those who had negative comments on the survey item concerning studying from home wrote that they thought it was a nice option to have.

Two factors were common for those who disagreed about their course and distance education. First, they thought that the course they were in didn't lend itself to distance education. One of the students voicing this sentiment wrote about the web-based course management system, "Not for this class. For a different class, an easier class this would work well." Secondly, distance education didn't appeal to them personally. A written communication student commented, after disagreeing about the importance of taking this course using distance technology, reflected the sentiment of those for whom distance education held no appeal. "I personally like the classroom interaction."

Several comments about technology were peculiar to that particular technology. For example, many of the students in the traditional ITV class commented negatively about having to submit work via the web-based course management system. The instructor of the course had taught that course several times before and had experienced frustration with all other forms of submitting work. The interoffice mail had proven ineffective in allowing work submission. It was often slow and unreliable, sometimes taking more than a week to return papers from other campuses. When students took exams, they were anxious to get their results quickly. Using a web-based course management system not only eliminated wait time between submission and reception of work but also eliminated another problem that a written communication student commented on. "Our worksheets & assignments at times have gotten lost in the shuffle. Where if she was in the classroom this would not happen." Students need to be told how distance procedures enhance their learning.

One of the common traits of successful distance education programs was a strong support staff. The pilot study survey asked about support. For that particular question, the averages for the different teaching methods were: Traditional, 3.53; ITV Remote, 3.31; Web-based course management system, 3.21; ITV base, 3.00; ITV experimental, 2.91; and IP-video conferencing 2.63. Only 11 of the written comments related to support. There were 9 comments from students who were dissatisfied or very dissatisfied with the level of technical support.

The support staff devoted more time and effort to the pilot study than to the usual instructional methods. During the IP-video conferencing portion, one of the instructors had a support staff person beside her the entire time. All three instructors felt they did not have adequate training before using IP-video conferencing. One instructor wrote, "I see now that I would have benefited from additional training before the unit started."

It wasn't just the faculty that could have benefited from more support. The technical support satisfaction for IP-video conferencing (2.63) was significantly lower than any other technology. Only two students commented directly on the support received during that portion of the course. One wrote, "Hardly anyone was around to help when things went wrong." Deciding how to classify a particular comment as relating to technology or support was difficult. There were 15 total comments about the support received or the technology by students using IP-video conferencing.

Perhaps the low level of satisfaction with support was related to the number of support staff trained in IP-video conferencing. Only three faculty/staff members were designated to support IP-video conferencing, and all three worked during the day. If lack

of personnel were the reason, the night class should have had the lowest score for support. In fact, one of the daytime courses had a lower satisfaction rating for the level of support offered.

The clearest data concerning student perceptions about technology were related to IP-video conferencing. Not only was the level of satisfaction the lowest (2.00), but the comments listed some of their dissatisfactions. Of the 14 commenting on this distance method, 13 were negative, and almost all commented on either its propensity to break down or annoyance at the delay between audio and video reception.

Research Question #3. Using factor analysis, what significant contributions to student satisfaction are related to delivery method and course enrolled?

Hypothesis: Student satisfaction will be highest in XML.

This research question was not answerable by factor analysis, since some of the variables in the question lacked ratio data, a fundamental requirement of factor analysis. Even though factor analysis was unable to determine relationships, much of the data pointed to different levels of satisfaction among the courses and technologies. Factor analysis did help determine that much of the variation in student satisfaction was related to a component closely reflected by S10 (Overall). Factor analysis results would allow this survey item to represent the rest of the survey items.

The highest level of satisfaction among the courses analyzed was for XML ($\bar{x}=3.44$). Thus, the hypothesis seems to be confirmed, although factor analysis was not the tool used to make that determination.

Of the 9 negative comments on CVTC support, four specifically mentioned lack of training in web-based course management. This finding was probably closely allied with the inability of factor analysis to extract another component of variance. It would be logical that the satisfaction with the support for web-based course management would be lower. In fact, that average was second highest (3.21). Many instructors at CVTC use web-based course management to enhance their traditional curriculum. Most of the students in the class that used ITV (chemistry) were usually returning students taking their first college class. These students would have little experience with computers in education and even less in web-based course management systems. As the semester progressed, students became more confident in their abilities. Supporting the contention that students get more adept at using the technology, one of the ITV base students, commenting about S2 (Access) in the final survey of the semester, wrote, "Blackboard was initially difficult to use."

The comments by the ITV students were especially helpful in supporting previous findings that remote site students were more satisfied than their base site counterparts. The ITV remote site students (3.31) were more satisfied with their course than the base site students (3.00). The greatest number of negative comments was submitted by students in the ITV base group. Their complaints centered on lack of training in using the web-based course management system. One dissatisfied student wrote, "Needed help-no help." Interestingly, they received the same instruction for using the technology as their ITV remote site counterparts. In fact, an argument could be made that they had more opportunity to ask for assistance, since their instructor was almost always in the

same room. Previous research revealed that students at the base ITV site resented any adaptations they needed to make so that the ITV remote site students could be served. No remote site student commented on the amount of support received.

Perhaps negative comments about chemistry are tied to a lower satisfaction among both experimental and control groups for the chemistry class. Some of the comments were related to the difficulty of conducting lab experiments when the teacher was not physically present. One remote site chemistry student wrote, "With only enough material for a group of two instead of everyone being with someone else, our class works together as one big group."

One type of comment stated the pace was too fast in chemistry, as shown by this comment from an ITV remote student when responding to S1, (materials), "Well he does but he goes way to fast and I don't understand everything." Lest the dissatisfaction be ascribed to the teacher, an IP-video conferencing student wrote, "For a chemistry class it is hard to not have the teacher in the room to give help to us. For a different kind of class this would work but not for chemistry. Too much to learn & memorize to do w/out teacher right there."

Research Question #4. How satisfied are teachers with the quantity and quality of teacher-student interaction via each distance-education method?

Hypothesis: The teachers will be satisfied with the interactions for each of the course delivery methods.

The hypothesis is not supported by the data and analysis. While the experimental ITV and web-based course management systems did receive high scores in teacher

satisfaction, IP-Video conferencing did not. The survey item about choosing to use this technology in the future prompted one instructor to write, "I don't think I would want to deliver this particular course via Centra." Another wrote, "I would even say presenting any science course with this technology is professionally negligent." Factor analysis showed that instructor satisfaction was most influenced by the interactions with their students.

Seeing the teacher was important to the students, but seeing the students was even more important to the instructors. All three wrote at least once on the importance of seeing their students. When commenting on the experimental ITV, one wrote, "I would rather have face to face with good resolution so that when I see a question on someone's face, I can answer it."

Research Question #5. Using factor analysis, what significant contributions to teacher satisfaction are related to delivery method and course enrolled?

Hypothesis: The factor most highly related to teacher satisfaction will be the course taught.

Factor analysis was unable to be made because there was no variance between teachers and the course they were teaching.

Research Question #6. What is the level of student achievement using each of the distance-education methods?

Hypothesis: Students' grades will not vary significantly among the trial methods nor between the trial and control groups.

The hypothesis is not supported by the pilot study data. The students in the experimental group had significantly higher achievement (2.18, C average) than the control group (1.38, D+ average). The large amount of dispersion in grades (standard deviation was about one and a half letter grades) in both cases was somewhat troubling.

The troubling aspect of the dispersion was the indication that a large share of the students failed that section. In fact, of the 123 grade data for the experimental group, 29 had *F*'s. Of the 156 grade data for the control group, more than one-third failed.

Research Question #7. What comparison exists among the three distance-education methods and traditional classroom methods in student achievement?

Hypothesis: Student achievement will be highest for XML.

XML (1.74, C-) had the highest level of achievement of any course. The hypothesis specifically addressed courses. The hypothesis implied the only comparison would be by course. If the hypothesis had allowed comparison by technology or course, the highest average would have been recorded for students using the experimental ITV technology ($\bar{x} = 2.79$, B-).

Recommendations

Many of the findings of previous research studies in distance education were confirmed in the pilot study. Some new but logical findings resulted from the pilot study and the data analysis of this study. The recommendations from this study are presented by topic.

1. Technological strengths and weaknesses

2. Instructor and student characteristics
3. Academic and technical support
4. Recommendations for further study

Technological Strengths and Weaknesses

Colleges need to match courses to the correct technology. The pilot study indicated that at least one technology was inappropriate for the pilot study courses. While two of the courses seemed to work well with the ITV section of the pilot study, the third did not, because the screen resolution was too low to allow students to see what they were to learn. Only one of the courses even approached usability with the IP-video conferencing portion of the study. In fairness to that technology, it is usually employed only for corporate meetings and such. It is marketed as an application sharing tool; yet none of the three courses used that feature.

Schools need to decide which courses should be taught using distance education. The student comments indicated that courses with extreme amounts of rigor may be poor candidates for conversion to distance education. If such courses are converted, the students need to be informed that these courses are rigorous. They also need to be given a list of the special traits possessed by students who succeed in these types of distance education courses. In the study, basic chemistry received many comments on its difficulty, rigor, and pace. Some of the students did not complete the course. Chemistry always has a waiting list for enrollment. If a way existed to favor enrollment for those

who have a high likelihood of success, then the number of those passing the course would increase.

Many courses have special circumstances that make them poor candidates for delivery via distance education. The study indicated that courses with laboratory requirements such as chemistry are prime examples of those with special circumstances.

If direct verbal and visual communication is the most immediate (direct) form of education, any distance technology needs to be as close to immediacy as possible. The comments about the IP-Video Conferencing technology indicated students and instructors were frustrated by time delays in communication.

Transparency is also important, since the greater the extent to which the technology is noticeable, the less transparent it is. Some students commented on the difficulty of initially understanding the web-based course management system. Instead of learning the course content, these students struggled to learn the technology thus delaying their learning.

Schools need to choose educational technologies that are transparent. If students spend too much time learning the program, they won't spend enough time learning the course material. Students and instructors in the pilot study both commented about inability to get some essential information through the distance technology. To whatever extent the distance technology inhibits communication and information transfer, it inhibits education.

Education is always mediated. Good pedagogical techniques always attempt to make the learners be part of what they are learning. The students indicated they liked

courses better when they were actively involved. Wouldn't participating in a discussion with Socrates be better than reading about the Socratic Method? In the same way, mediated instruction should strive to be as immediate as possible. Distance education is most successful when students don't notice that they aren't in the classroom with their traditional counterparts. This immediacy is achieved when distance technologies are transparent. Several student comments indicated they felt just like they were in the classroom.

Instructor and Student Characteristics

Based on the research data, several points can be made that are common for both teachers and students. Successful distance education instructors and students share several characteristics. Among those characteristics confirmed by the study were those concerning type and level of interaction between participants. Students need to be active in their education in both the traditional classroom and in distance learning.

Student characteristics influenced many aspects of student satisfaction with distance education. In their comments, the students gave insight into their personality, particularly their ability to concentrate. During the ITV portion of instruction, negative comments about ITV and IP-video conferencing suggested that some students found difficulty concentrating. The instructors also noticed the inability to concentrate. Commenting on students' responses to IP-video conferencing, one teacher wrote, "I don't think students get as much out of watching as seeing live." Some students who have

difficulty concentrating without the instructor present do not learn as well as when the instructor is present.

The most important finding about student success was their need to be active learners. *Education* derives from Latin words meaning *to lead out* (Oxford, 2004). *Instruction* derives from Latin words meaning *to pour in* (Oxford, 2004). For any educational endeavor, success only comes when past knowledge is tied to present information. Students are not passive empty vessels into which teachers pour knowledge. The students' comments vividly show the importance of being an active learner. Concerning the overall satisfaction one XML traditional student wrote, "While I prefer classroom environments to a non-traditional delivery, I have to say that what is going to make or break an effective learning environment is going to be the student's own motivation. And an added benefit of non-traditional deliveries is that it teaches a student that there are other ways to learn other than being spoon-fed lectures."

Instructor comments suggested that if students need to be technologically savvy, instructors need to be even more so. The first contact students have when they encounter problems is with the instructor. Typical technological abilities would seem to include such things as resetting passwords, accessing all the information, and making information available in the most user-friendly way possible.

In the classroom, the instructor can adapt to situations when a particular teaching strategy is not successful, even when it was successful the last 10 times it was used. In the distance environment, the student recognizes something isn't working and so chooses a different path. The successful distance course will have multiple modalities for student

success. The student comments showed that they appreciated a different method when they hit an educational roadblock.

Successful distance instructors are available to their students. They check their e-mail day and night. They check in on the weekend. Some of the comments from satisfied students stated they liked getting e-mail answers promptly. One of the CVTC student survey items implies that distance instructors provide less prompt feedback than traditional course instructors.

Comments from the instructors point to the importance of announcing when the instructor will and won't be available. The amount of time between e-mail and response is also crucial in improving both instructor and student satisfaction.

The most important traits that distance education instructors exhibit are to be personable with their students and to promote active learning. Just as cheerleaders encourage active spectators, good distance instructors promote active learning. Both cheerleaders and successful distance instructors are at once open, supportive, enthusiastic and engaging. Comments about each of the instructors indicated students like having these characteristics. Such characteristics are even more important in distance education than in traditional education, since the student has more control of the curricular aspects of education but less opportunity to receive the day-to-day encouragement that successful educators offer. Positive attitudes promote positive results. Emoticons, prompt e-mails, enthusiasm and personal caring are just some of the traits that show students that the instructors care about what they are teaching and whom they are teaching (Saenz, 2002).

Academic and Technical Support

Providing support staff is essential to student success. CVTC has pledged to increase enrollment in distance education. This research showed that an increase in enrollment cannot happen unless students and instructors have the support staff they need. CVTC can offer students an on-line or phone help system to take care of the technological issues of the distance courses. A way needs to be found for distance students who struggle academically to get the same help from the remedial help department that their traditional counterparts receive.

The negative comments on technical support show that while student satisfaction concerning support was highest of all the survey item means ($\bar{x} = 3.16$), the number and vehemence of the negative comments indicated that some students needed extra support. One of the biggest changes CVTC needs to make in order for distance learners to succeed is to lengthen the hours of technical and instructional support. At the present time, CVTC implies that distance education students will be more successful if they study during the school day when the teachers are around and the support staff is on duty. Instead, CVTC needs to be available when the students are learning. Not all students are going to need help, but those who do need help want it available in a timely manner. Students who study on weekends and or at night need support during those times.

CVTC has hired one and will soon hire another staff person charged with the responsibility of making course completion rates between distance and traditional courses equal. The responsibilities for these support workers need to include communication

with distance learners when they are falling behind, failing, or considering dropping courses.

The support system must also include helping instructors develop courses that can be presented using distance technologies. The instructor comments indicated they spent much time (and could have spent more) developing instructional tools for the distance education sections. A course development specialist has particular insight into what works in distance education. Trial and error in distance education produces too much error if instructors are not informed of the basics of successful programs. The TLC at CVTC can spearhead successful course conversion by helping teachers realize that students are the center of distance education. Material needs to be in a form that students can use, understand, and find. The location and access of all materials available to the students need to be intuitive.

Part of the help that a good support staff can offer is in professional instructional design. Sound pedagogical practices need to be applied in the field of distance education just as in the traditional classroom. Techniques that include promoting active learning are hallmarks of excellence in education. Active learning comes from the student being involved in the material. Successful strategies include discussions, peer reviews, self-check questions, and the like. Several student and instructor comments pointed to these strategies as important to student success.

Recommendations for Further Study

1. Several of the aspects of student satisfaction seem to be related to a variable in student satisfaction not considered in the survey. Students rated satisfaction for basic chemistry (mean 2.65) significantly lower than either written communication (2.84) or XML (3.44). The students in the traditional chemistry class made 12 comments on the rigor of the chemistry class. Perhaps the student satisfaction in learning is related to how difficult the material in the course is. Research comparing student satisfaction and course rigor may show if such a relationship does exist.
2. Previous research determined that graduate students were more successful in distance education than undergraduate students. Part of the reason given for being more successful is that the graduate students were more goal-oriented. If undergraduate students are less goal-oriented than graduate students who are farther along in their education, beginning undergraduate students are even less goal-oriented. It seems that courses for beginning students will have less success than courses for more advanced students. Further study may determine that evaluation of the success of a distance education course would include whether students are beginning or farther along in their programs.
3. The pilot study had at least 11 significant limitations. Several of the limitations were related to the sampling procedure. Further research of the same questions may yield different results if the students self-selected the learning technology. Perhaps, a set of identical course offerings could be made where the only

difference was the technology used to present the course.

If the students were appropriately informed of their participation in a research study, it might be possible to separate their frustration of feeling misled from their frustration with a particular technology. Properly informed research subjects are aware of their participation in a study well before the beginning of the study and are also able to select a course not part of the study before such courses are full.

As distance technologies mature, they will become more transparent and better able to be effective educational media. As schools learn more about what works in distance education, they'll be better able to provide an effective educational program. As instructors learn more about best practices in distance learning, they'll present better courses to the students. As students discover their strengths and weaknesses, they'll be able to determine if distance education is a match for their learning styles.

The present time is, indeed, one of the most interesting ever in post-secondary education. Distance education is part of that excitement. Excellence in distance education is demonstrated when students actively receive an education from instructors who are enthusiastic supporters of their education using technologies that are appropriate to the course and as immediate as possible. All will be successful in distance education when best practices in distance education are implemented.

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Appendix A: Piloting Three Technologies

INSTRUCTORS AND COURSES:

Terry Bilderback -- XML
Kevin Hulke -- Basic Chemistry Calculations
Marian Smith -- Written Communications

TECHNOLOGIES:

Polycom for Synchronous IP Video Conferencing and Web archiving, two-way audio and video
Centra Software for Synchronous Interactive Meetings, two-way audio and one-way video
Blackboard Software for Asynchronous Course Delivery

PURPOSE:

This pilot will evaluate student satisfaction, student achievement, and instructor satisfaction using three different types of technology. A standard set of data will be collected at the end of each delivery session for comparison purposes. This data will include student surveys, teacher surveys, and an objective measure of student achievement that must be the same measure within each delivery method. This measure of student achievement can be test and quiz scores, project grades, discussion or group work points, or activity grades.

It is hoped that the instructor will deliver the same class in a traditional format during this time to provide additional data for comparison.

The data will be collected and analyzed by the TLC team to assist in decision making in the use of technology for instruction.

SUPPORT:

Training on technologies will begin in November and continue until Winter Break. Continuing individualized training will be available on an as needed basis by contacting TLC team members.

Assistance with conversion of course materials to PowerPoint, Word files, digital recordings, or other app share files will be provided by Word Processing, the Media Center, and TLC team members.

METHODOLOGY:

Each course will be delivered using three technologies, each for an interval of five weeks.

Week One: Instructors meet with students in a traditional format. Course syllabi, introductions, policies and procedures, requirements, and technologies will be explained. The last meeting of Week One will include an introduction to the Polycom delivery and protocols for the next five weeks.

Week Two through Week Six: Instructors will be delivering course material via WebCast using Polycom in the Media Production Room located in Room ECB 135. Students will be attending the class live in their assigned classrooms, which are also equipped with Polycom. Instructors are limited to interacting with the students through the Polycom technology, email, voicemail, or other methods, but instructors may not go to the classroom in which the students are located. Optionally, the instructor may web-enhance this portion of the course with Blackboard. All class sessions will be digitally recorded and Web archived for student reference.

Coursework delivered on Polycom is similar to delivery in a multimedia classroom except you will not have a VCR. You will use a computer with Microsoft Office products loaded and Internet access, as well as a document camera. Any videotapes will need to be digitally mastered for broadcast within the Polycom medium. The Media Center will assist with any video conversion.

At the conclusion of Week Six, students will complete a standard survey developed by the TLC team assessing their satisfaction with the technology. Instructors will also be asked to rate their satisfaction and to submit data on student achievement. The instructors will also introduce the next technology.

Week Seven through Week Eleven: Instructors will be delivering course material via Centra. The instructor can deliver the course from any Internet ready computer, including his or her office computer, using a microphone equipped headset. Students may participate in this synchronous delivery from any Internet ready computer, using a microphone equipped headset. The College will identify open lab spaces for student use during this class time, but students may participate from home computers. Instructors are limited to interacting with students through Centra, email, voice mail, or other methods, but they may not go to the lab in which students are located. Optionally,

the instructor may Web enhance this portion of the course with Blackboard. All class sessions will be recorded and available for student review within Centra.

All class lectures must be in PowerPoint format for delivery in Centra. Other activities in Centra will be accomplished through software features for discussion, collaboration, impromptu quizzing, and whiteboard. No document camera is available in Centra, so instructors will need to have digital documents and examples prepared. Any videos will need to be digitally mastered and Web archived for student viewing in advance of the Centra sessions.

At the conclusion of Week 11, students will complete the standard survey. Instructors will also be asked to rate their satisfaction and to submit data on student achievement. The instructors will also introduce the next technology.

Week 12 through Week 16: Instructors will be delivering course material via Blackboard software. This is primarily an asynchronous delivery method, so instructors can load materials for the course any time prior to Week 12. The students can access the materials 24/7 during this five-week session. Materials to be presented in Blackboard should include lecture notes or outlines, PowerPoint presentations, Web links, tests and/or quizzes, assignments, activities, and some group work/discussion. The instructor has the option of conducting group work synchronously via the virtual classroom in Blackboard or asynchronously using the Discussion Board in Blackboard. Additionally, instructors may provide to students digitally recorded lectures on CD or via Web archives.

Instructors and students may interact in the Blackboard section from any computer with Internet access.

At the conclusion of Week 16, students will complete the standard survey. Instructors will also be asked to rate their satisfaction and to submit data on student achievement. Instructors who are teaching the same class in a traditional format will be asked to survey those students and submit the survey and student achievement data from the traditional class for comparison purposes.

Also during Week 16, instructors and students will be invited to attend a meeting to provide the TLC team with some summary feedback and to thank them for their participation.

PLAN B:

In the event of complete and long-term technology failure, the instructors and the students will return to the traditional classroom to complete the course. However,

minor technology failures are expected to occur and instructors must anticipate some down time due to this. Flexibility and adaptability to schedules will be needed.

Course material and learning are not to be jeopardized by this pilot project. Instructor expertise in judging the amount of down time is essential. If a concern arises regarding ability to complete the course competencies, instructors should immediately contact the TLC team to discuss options.

OUTCOMES:

All information and data collected will be analyzed by the TLC team and will be confidential. It will not be used for instructor evaluation.

After analysis of data the TLC team will make recommendations to the Executive cabinet including the following:

- Effectiveness of the technologies
- Types of classes and content appropriate to specific technologies
- Support services needed for instructor satisfaction and success
- Financial resources needed to provide quality educational experiences to students
- Support services needed for student satisfaction and success

Appendix B: Instructor Feedback

Technology Integration Spring 2004

Course Name _____ Instructor Name _____
 Date _____

Circle the delivery technology you are evaluating:

Centra Blackboard Webcast/IP Video Conf./Polycom

Please use this scale to react to each of the following items.

4 - Strongly Agree 3 - Agree 2 - Disagree 1 - Strongly Disagree

You may also add comments on any item.

1. The delivery technology provided a good method for me to deliver my lecture information and/or class notes.

4 - Strongly Agree 3 - Agree 2 - Disagree 1 - Strongly Disagree

COMMENTS:

2. The delivery technology allowed me to easily and efficiently post course materials and/or documents for use during class or for independent use by students.

4 - Strongly Agree 3 - Agree 2 - Disagree 1 - Strongly Disagree

COMMENTS:

3. The delivery technology allowed me to conduct effective educational activities using group discussions and/or group work.

4 - Strongly Agree 3 - Agree 2 - Disagree 1 - Strongly Disagree

COMMENTS:

5. The delivery technology included methods of instruction (e.g. lecture, discussion, worksheets) that allowed me to teach the students effectively.

4 - Strongly Agree 3 - Agree 2 - Disagree 1 - Strongly Disagree

COMMENTS:

6. The delivery technology allowed me to deliver all of my course content.

4 - Strongly Agree 3 - Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

7. The delivery technology allowed me to communicate effectively with the students.

4 - Strongly Agree 3 - Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

8. The delivery technology allowed me to provide appropriate assistance to students.

4 - Strongly Agree 3 - Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

9. The delivery technology offered ample opportunity for me to interact with my students.

4 - Strongly Agree 3 - Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

10. The technology had few or no breakdowns that interrupted my teaching.

4 - Strongly Agree 3 - Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

11. CVTC provided me with good technology support.

4 - Strongly Agree 3 - Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

12. Student achievement in this technology was about the same as it would be for this course content in a traditional class.

4 - Strongly Agree 3 - Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

13. Student retention during this technology was about the same as it would be for this course content in a traditional class.

4 - Strongly Agree 3 - Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

14. Student satisfaction with the course content delivered in this technology seems about the same as it would be in a traditional class.

4 - Strongly Agree 3 - Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

15. Overall, the delivery technology provided an excellent teaching experience.

4 - Strongly Agree 3 - Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

Appendix C: Student Satisfaction Survey

Technology Integration Spring 2004

Course Name _____ Instructor Name _____
 Date _____

Circle the delivery technology you are evaluating:

Centra Blackboard Webcast/IP Video Conf./Polycom

Please use this scale to react to each of the following items.

4 - Strongly Agree 3 - Agree 2 - Disagree 1 - Strongly Disagree

Circle your response and add any comments.

The delivery technology provided a good method for me to receive my instructor's lecture information and/or class notes.

4 - Strongly Agree 3 - Agree 2 - Disagree 1 - Strongly Disagree

COMMENTS:

The delivery technology provided easy access to course materials and/or documents.

4 - Strongly Agree 3 - Agree 2 - Disagree 1 - Strongly Disagree

COMMENTS:

The delivery technology allowed me to interact with other students effectively in group discussions and/or group work.

4 - Strongly Agree 3 - Agree 2 - Disagree 1 - Strongly Disagree

COMMENTS:

The delivery technology included methods of instruction (e.g. lecture, discussion, worksheets) that allowed me to learn and apply information.

4 - Strongly Agree 3 - Agree 2 - Disagree 1 - Strongly Disagree

COMMENTS:

The delivery technology created a class environment conducive to learning.

4 - Strongly Agree 3 - Agree 2 - Disagree 1 - Strongly Disagree

COMMENTS:

The delivery technology allowed me to interact with the instructor effectively with me.

4 - Strongly Agree 3 – Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

The delivery technology allowed the instructor to provide helpful and timely assistance and feedback to me.

4 - Strongly Agree 3 – Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

1. The delivery technology actively involved me in what I was learning.

4 - Strongly Agree 3 – Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

The technology had few or no breakdowns that interrupted my learning.

4 - Strongly Agree 3 – Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

CVTC provided me with good technology support.

4 - Strongly Agree 3 – Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

Overall, the delivery technology provided an excellent learning experience.

4 - Strongly Agree 3 – Agree 2 – Disagree 1 - Strongly Disagree

COMMENTS:

Appendix D: Student Letter Introducing Pilot Study

Dear _____:

You have enrolled in _____, which is a course that is delivered using three technologies. You will have the opportunity to assess your learning success in a variety of instructional systems.

The three technologies will each be used for a period of five weeks. The first technology is a type of instructional television. It includes real-time two-way audio and video, allowing you full interaction with your instructor and classmates. Your lessons and assignments will be presented to you in a CVTC classroom equipped with the technology you need. These class sessions will also be available for later playback..

The second technology is electronic conferencing software. This technology includes two-way audio and one-way video. This will allow you to view and hear the lessons and assignments and to interact with your instructor and classmates. You can participate in this real-time interactive learning experience from any computer equipped with high-speed Internet access and a headset with microphone, including the labs at CVTC using a headset. These class sessions will also be available for later playback.

The final technology is online learning using Blackboard, a software product with which you may be familiar. This software will make your lessons and assignments available to you 24/7. You can interact with your instructor and classmates by e-mail, discussion board, and virtual classroom. You can participate in this anytime learning experience from any computer with Internet access.

Your instructor and the college are excited about this opportunity and hope that you will also enjoy it.

To begin this class, you will report to your assigned classroom (see your class schedule). During the first week of class your instructor will fully explain all the details and will start the course. At this time you can be assured that all necessary technology will be provided by the college. Your instructor and the college are committed to providing you with a quality educational experience and to helping you to succeed in this course.

If you have questions about this special course offering in which you are enrolled, please call the college at 715.833.6200. When the automated system answers, please select 0 immediately. This will allow you to speak to the information desk personnel.

Sincerely,

Teaching and Learning Center Team

Appendix E: Student Feedback on Online Teaching and Learning

1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

1. Course objectives are made clear to me.
2. Course is relevant to career and/or personal goals.
3. Course content meets expectations.
4. Course pace is appropriate to meet the objectives.

Comments:

5. Course objectives are met.
6. Course materials (related readings, media, study guides, etc.) help me learn.
7. Course layout is logical and easy to comprehend.
8. Course materials are easy to access.
9. Course assignments are well-organized and understandable.
10. Course actively involves me in learning.
11. Course provides opportunities for learning from other students.
12. Course materials clearly state grading and evaluation criteria.
13. Instructor provides meaningful and timely evaluations.
14. Instructor displays a complete working knowledge of the content.
15. Instructor invites student feedback, discussion or comments.
16. Instructor responds in a timely manner to student needs.
17. Instructor involves students in active problem solving.
18. Please complete the sentence in the space below.

Taking this course online is important to me because. . .

19. I would take another online course based on this online experience.
20. Please provide additional comments. What's helping you learn? How could this class be improved?

Appendix F: Verbal survey comments

S1

The Classroom environment provided a good method for me to receive my instructor's lecture information and/or class notes.

materials

did not like it, some times we could n/t get it to work or we didn't get on the right day again had to go to Blackboard/e-mail etc for all handouts & info. (makes it difficult when not everyone has Internet @ home!)

Although I wish I was not a part of the control class, because I think the other class had to be more interesting

But didn't help with the over all learning for quizzes or/and testes.

can't really know who is participating in class when people answer questions could use more time on certain sections

Deminstrations were almost impossible to view through video projector

Due to the glitches that the students experienced with the system some students were unable to take the class from home so therefore it defeated the purpose.

Going to school in Chippewa is convenient.

Hard to ask questions and I had a hard time consintrating on how the lecture was being presenting

Hard to get wkst

HARD TO KEEP MY ATTENTION ON A T.V. SCREEN!

HARDER TO INTERACT WITH INSTRUCTOR AND THERE WAS NO INTERACTION WITH OTHER STUDENTS FELT VERY MUCH ALONE & LOST AT TIMES

I agree that it was easy to receive lecture & class notes but I think this is not a good technology for chemistry class. To much to learn.

I can do it from home.

I can receive the lecture without attending class, but less ability to have follow up questions

I didn't have any trouble understanding what needed to be done.

I don't believe this was a good method. This method was very impersonal.

I think the chapters are run through too fast and it's hard to catch it all in such little time.

I would have rather been in the same room as the instructor.

It did, But if I had a question I felt stupid Buzzing in to ask the question.

It was great that Webcasts were archived for later use.

It was hard to interact totally because their wasn't a teacher here at all times and other classes were being taught not as much 1:1

It was learning from notes.

Kevin did a great job presenting problems on the screen and showing us things as he would of in the classroom.

Microphones are not very sensitive. Even with the microphone 3 ft away I continually had to repeat myself to be heard by Kevin.

Middle school students in hall make a lot of noise
not as easy as one on one

Some more pre-recorded lectures/demonstrations would be helpful. 4

Sometimes you had to watch it on ITV, that didn't work very well for me personally

There were many problems with the technology and it distracted me from learning.

Was not always there.

We he does but he goes way to fast and I don't understand everything

We were able to see and hear the instructor as if she were in the room with us.

Well it does but also we too fast I feel.

When we say something to Marian at times it appears that she doesn't hear us.

would rather have Kevin in front of me

You had to have high speed internet - not every student has it.

S2

The classroom environment provided easy access to course materials and/or documents

access

BB was used throughout the course for documents.

BLACKBOARD WAS INITIALLY DIFFICULT TO USE

computer access would be nice every period.

Everything online

George did a good job bring us the papers we needed.

Had to get alot of notes off blackboard & quizzes

half of the videos would not play

I never tried to do the sessions after the class time so I don't know if they would work or not. -

I really like being able to go to Blackboard to print things re: reference back to things.

If I could log on it might not be so bad but half the time you couldn't

it was awful I will not take a class knowing I will be on Blackboard

It was really hard to receive anything from the course

most of the time

need to walk through how to access tests and quizzes

No, we are always tumbling around to keep up to Eau Claire.

Should be more instruction on how to use Blackboard for people who haven't used it

yet

Sometimes not cause I don't have a computer
sometimes things did not make it on to the Blackboard right away

This technology did not allow for easy access to materials because she was not here
so it was harder to get materials

Was not there all the time when I needed it.

We had a computer right outside the room to get our materials needed for class

We had NO interaction with the teacher at times we couldn't hear her & most of the
time she didn't hear us.

We were unable to hear Marian Smith on our home computers talking to us even after
our computers were checked over by professional.

when the email worked

would be nice to be in a computer lab

S3

The classroom environment allowed me to interact with other students.

interact student

Didn't like it. Wasn't conducive to learning

Either way you can interact with each other, so I really don't see how this is
beneficial.

In lab yes!! But not always in class on Mon & Fri

It doesn't inhibit interaction with students outside of class, but there is less need to
attend class.

It is hard to find the time for chat. Unless you schedule in advance

It was hard at times though

ITV allows you only to interact with you own classroom directly, not with other
classrooms.

Just like a normal classroom you could meet and talk with other students

Not much interaction via Blackboard

People didn't show up, how could we interact!

students in Chippewa!

students were kinda shy

Technology had no effect

The only interaction was to express frustration on the technology

The only time we really interacted was when we met for class meetings.

The technology had nothing to do w/ interacting with other students

Was no interaction

We may interact if we want but with this class there isn't much time besides lecturing.

With only enough material for a group of two instead of everyone being with someone else, our class works together as one big group.

Without the instructor in the room I think made it easier for us the students to talk about things.

You couldn't!

S4

The Classroom environment included methods of instruction (e.g. lecture, discussion, worksheets) that allowed me to learn and apply information

methods

Again a lot on computer makes it tough when you don't have one.

Again it was difficult to access.

but I am more of a hands on learner

But I still don't get all of it.

Computer images were UNREADABLE on the Big Screen.

Didn't like it. Would of preferred classroom

I feel this only happens sometime

I think the class should be slower paced

I was so distracted by the "technology" that I couldn't concentrate on the information that was given.

it's helpful finding info on blackboard

more visual material (recorded lectures, etc.) would have been nice

no, it didn't!

Our worksheets & assignments at times have gotten lost in the shuffle. Where if she was in the classroom this would not happen

Using Blackboard can really be frustrating. It doesn't support communication with instructor. So when you have a question sometimes it's a day before they are answered.

Watching ITV gets confusing and hard to pay attention.

We lose the hands on ability that being able to have a computer allows

With the difficulties we experienced with Centra I feel that our learning suffered immensely.

Yes, the Blackboard pages help a lot because we never get done with a full lesson and we have notes to look back to.

You got all of the above, but it would be a lot better with the instructor right in class with you.

S5

I could use the classroom environment to interact with the instructor.

interact teacher

I did not feel comfortable talking into the mic. and when I tried the relapse of me saying it and then hearing myself was distracting

3

As stated in #2. Also I felt we were not being talked TO we were talked AT
 Couldn't do it.

EASIER TO ASK QUESTIONS IF THE INSTRUCTOR IS IN THE ROOM.

easily approached

except for the microphone problems

He's not here and it's hard to do things over ITV.

He was at EC Business Center, and that is where I took the class.

I can use the class room to SPEEK to him - NOT INTERACT

I feel free to ask a discuss questions I may have during class

I was unable to access from my home computer.

If a hand was raised, it was hard for him to see. So when you get called upon a couple minutes later, you were already completely lost!

It is cold and intimidating

It was hard w/other sites all on different pages.

It would be easier if he was really here to explain things more thoroughly.

Kevin is very good about returning emails quickly & is easy to meet w/ if necessary.

not very well; It is not like having an instructor in class. I miss that!

Not well can't always here.

Nothings better than the classroom though

Sometimes it was difficult if there was a failure. At times technology made instructor feel distant. Not as friendly environment that way.

Sometimes it was hard for her to us.

Sometimes it was hard.

sometimes the instructors are not in office at the time so you need to wait for an answer

sometimes we couldn't at all!

somewhat intimidating to talk without him there - He had a difficult hearing us at times.

To an extent, you can interact.

Very hard to communicate

very hard to get comments across the microphone during class

very open environment

When I needed to really interact with her I just went to her office.

You can interact but not as much as I would have like to!

S6

The classroom environment allowed the instructor to provide helpful and timely assistance and feedback to me.

teacher help

Always posted announcements and answers to my questions promptly at times Marian couldn't hear us.

Can learn a lot more effective with the instructor with you in class.

Didn't happen

Found it hard to ask questions

Getting assignments from someone other than the teacher made us feel that we couldn't get feedback from the instructor other than what was written on the papers.

had to e-mail a lot of questions/assistance

He's not in our room so it's hard to ask or explain stuff.

He pushed in a short time.

I like getting feedback after our unit tests.

I think it had a lot to do with the instructor.

IF A PERSON HAD A NUMBER OF QUESTIONS, IT WAS HARD TO EMAIL ALL OF THEM - WOULD HAVE HAD TO MAKE AN APPOINTMENT WITH INSTRUCTOR

It was hard to get what was needed as quickly as we needed to.

It was hard to.

It was more lecture and repetitive work.

It would be nicer to have Kevin in the room to help us.

limited

No assistance was provides all the time, we depended on each other

No cause, i feel he caN BUT THEN GOES WAY TO Fast over things.

not the same as teacher to student but, yes

see #5

There was always time for us to ask questions and he was helpful. We could use a problem in a book or worksheet we both had.

We meet in class once a week.

Well I feel he does but also goes too fast.

Would be nicer to be in a lab for all classes instead of 1/8 of the time

would like longer time but very good

S7

The classroom environment actively involved me in learning.

involved

Although the class was confusing & hard to understand
 but I didn't care for it
 Felt like I was just watching T.V., and didn't really seem to have any point to it!
 Having him on the screen was almost like having him there.
 I don't feel that it was INTERACTIVE at all
 It's hard to do labs and participation activities.
 It is just not as interesting.
 No interaction w/ instructor
 Not at all. Felt left out.
 not enough material for everyone to do it by themselves or in a group of 2 people
 some way yes but it's hard to understand all of this.
 we are separated there's not a lot of control over the class. talking and stuff
 WOULD HAVE BEEN MORE MOTIVATED IN REGULAR CLASSROOM
 SETTING

S8

The classroom had few or no technology interruptions that affected my learning.

interruptions

All in All, the Virus was a hassle

Centra was hard to communicate though there were times when we couldn't hear the instructor or she could hear us.

few

i

Id rather have to see the teacher in person then talk to a screen.

In order for everyone to hear they had to be quiet. Everyone was perfectly quiet.

It seemed like everything was delayed & he cut in & out a lot.

Just a couple, nothing major

major breakdowns - unable to access from home even after having my computer checked out by professional

missed class due to lightning - you can not be on a computer during a storm!

Need better than 56K connection

nothing significant

sometimes hard to see screen

SOMETIMES VIDEOS OF FORMER CLASSES WEREN'T AVAILABLE

sound some times cut off or screen shut off

sounds seem to have problems often; 1 day it's good, next you can't hear

There was a lot of times where the instructor would cut out.

There were a few, but were remedied very quickly.

We wasted a bit of time getting sound hooked up finding students on the camera.
When watching at home hard time with sound

S9

CVTC supported my learning through appropriate technology and technology-related student services.

support

2

class held in computer lab.

Didn't happen

Hardly anyone was around to help when things went wrong.

needed help - no help

There was a technician there may be 2 times for a total of 5-7 min.

there where people there whenever we needed them

they didn't know much about it themselves they were learn just as

Would like to be in computer lab more often Labs should be more often

S10

Overall, the classroom environment created an effective learning environment.

overall

Almost a 2.

but I would rather have the teacher for this type of class directly there - This is too hard a subject and it would be easier for a teacher to be in the room to see the students' faces if problems. keep more interested with teacher directly there

Difficult to learn

Even though this position was in blackboard, I spent more time in the classroom as many students agreed it was a better learning environment.

For a chemistry class it is hard to not have the teacher in the room to give better help to us. For a different kind of class this would work but not for chemistry. Too much to learn & memorize to do w/out teacher right there My thoughts in NO WAY reflect my thoughts of Kevin. Just the technology. Kevin is a wonderful instructor. He is helpful, thorough, and a great teacher!

I'M NOT SURE YET!

I couldn't pay attention!!

I did not like this at all Very impersonal

I DON'T LIKE USING BLACKBOARD FOR CLASSES

I HATED this! If I had been aware (or even asked) that I was being made a guini pig out of I would never have taken this course. I wanted a teacher in the classroom. I am so frustrated to have been made to take this class!

I only used blackboard for -1 WEEK. I did not feel I was learning & went to class instead.

I STILL PREFER HAVING THE INSTRUCTOR IN THE ROOM.

I think Kevin is very good at his job. Chemistry is not very easy and to most people an exciting course and he makes sure there is some joking tike and he still gets his stuff out to us.

I think there has to be a way to make the class interesting. As informing as the class is, its very hard to stay motivated.

effective, however, I feel as if I could have understood better if the instructor was actually in the class with us. It's a lot easier to do labs and to see & hear the instructor when he's in the same room.

In class teaching is more effective.

It's easy to get off task.

It could work but this class is a more difficult class to follow on ITV.

It was horrible!!

It was really to remember to check the computer and if you had any question it was hard to communicate

ITV is too hard for me to concentrate and it gets confusing. I would rather have Kevin in front of our class.

Not at all. Didn't like it. Would have preferred classroom.

Once again the course is to fast paced for me personally. Especially when it's a non-credit course.

Overall, I do not like Blackboard. Rather I would like to take tests in the classroom instead of being tied to the computer to fulfill assignments.

Overall, I do not really like this format. If I had known this from the beginning, I would have taken a different class with an Instructor right in class with me!

Overall. it was weird not having my instructor in the classroom, but you get used to it. I liked it, because if you missed a class, you could watch it at a later time.

The main problem is it moves at a set pace, even if you are not getting it, the class just keeps moving even if you are not understanding what's going on.

The teacher was helpful in making sure we understood the material.

This should be used in the future!

This technology stressed me so much that I couldn't even concentrate on the information given

we were, I like being with an instructor its easier for me to learn

While I prefer classroom environments to a non-traditional delivery, I have to say that what is going to make or break an effective learning environment is going to be the student's own motivation. And an added benefit of non-traditional deliveries is that it teaches a student that there are other ways to learning other than being spoon-fed lectures.

Without the teacher in the room we had a hard time being structured.

would rather have him here to answer questions

Yes, because we're all trying to do what we can and pass by doing our best.

Yet as I have already stated I wish it was more hands on, such as group projects and anything else to make the curriculum interesting.

S11

How important is it for you to have the option to take this course using distance technology

distance

A nice option to have

and understand what I am learning. i would not take a class this way.

Chemistry is to hard a class to be taken & experimenting with -

I personally like the classroom interaction.

I think that distance learning is a GREAT option! Chemistry and a distance are difficult, maybe it would be great for some. Having an instructor there would have helped.

I would never use Centra again!!

if I could take classes like this would not have to get day care for my children and I wouldn't have to drive 54 miles one way to school

Not for this class. For a different class, an easier class this would work well.

Sometimes it is important to go into Blackboard and find out about your homework assignments.

I1

The delivery technology provided a good method for me to deliver my lecture information and/or class notes.

delivery

Camera angles not always good with doc cam can only view from top. With teacher cam no ability to zoom in.

Deliver and watching are different. I don't think students get as much out of watching as seeing live.

I could deliver my lectures, but I didn't have as much discussion. I try to engage students during the lecture. For many writing assignments, I like to have students work together or participate in peer editing activities in the classroom. This is not

I like having the document camera. The doc. camera makes it easy to show samples and to write my own examples.

Mainly because there is no live video presentation. If students weren't tentative about text chat or asking questions, I could get feedback.

I2

The delivery technology allowed me to easily and efficiently post course materials and/or documents for use during class or for independent use by students.

post

All material had to be preloaded so no opportunity existed to teach on the fly. In the spy cam video, there is no recording so students who later listen in only hear don't see

Centra allowed me to easily post PowerPoint presentations, but not the items I normally show on the document camera. Also, I like to write examples and information on the white board, which is easier to do in other teaching formats.

It was very easy to make course materials available with Blackboard, although it is more difficult to put samples of assignments on the site.

I don't think you could post material at all with Polycom. We could do things together in class but students could only view independently.

I also used BB for the traditional classroom students

It was easy to show pages from the book or course summary using the document camera.

I3

The delivery technology allowed me to conduct effective educational activities using group discussions and/or group work.

group

I had 20 students. I can't see anyway you could have group work like that.

By its nature, Centra isolated students from each other. They can access the class sessions any time, anywhere, which does not encourage group discussions or group work.

I had difficulty assessing the virtual classroom feature. Because of its unreliability, i made it optimal for students to participate, and none of them did.

After we got 2 mics, it worked better because the camera couldn't cover the whole room. I like to look at person talking.

I don't use groups with chem.

Small group work in the classroom works fine, although I would be more involved in each group's activities if I was in the classroom with the students. Students get less feedback from me with this technology while they are in the process of working on as

I4

The delivery technology included methods of instruction (e.g. lecture, discussion, worksheets) that allowed me to teach the students effectively.

methods

Lecture and apps sharing are the only two ways I see to communicate. I had to put all my material into lecture form.

I was able to lecture effectively. The students liked having the option to play back the sessions for review (if they had good sound quality).

Obviously, no lecture or discussion, although I did continue to meet with the students in person for one class session a week.

All the things I usually use worked. Camera angles and resolution prevented them from working better.

Again, delivery not as important as student reception.

As the unit progressed, students became more comfortable asking questions and more willing to participate in discussions (and answer questions).

I5

The delivery technology allowed me to deliver all of my course content.

content

None of the labs and demos could go over Centra.

There were some examples that I usually show on the doc. camera that I couldn't show. I didn't have time to re-do then as PowerPoint's, which could be changed for future classes.

All of the basic content could be delivered via Blackboard; however, this format provides no opportunity for coaching or group activities, which I feel are an important part of the class.

I couldn't do two demos and for one demo I had to go to room live and help them out. For some demos, they had to do stuff. May be dangerous.

Not labs.

No real difference between this technology and the current ITV system.

The delivery technology allowed me to communicate effectively with the students.

communicate

The communication I liked was the immediate feedback possibility.

About a third of the class members really hated Centra. I ended up teaching the classes in a traditional classroom and recording it for Centra at the same time.

Students did come to my office frequently during office hours, and I also met with them one day a week (which is not normally included with an inline class).

Some times sound not good quality

Their perception is more important

Being in a computer lab with the students while they are writing can be a very positive experience. However, the Polycom System does not allow this.

I7

The delivery technology allowed me to provide appropriate assistance to students.

assistance

The lack of transparency of the Centra made students hesitate to ask.

Many of the students dislike talking over the Centra system so they were less likely to ask questions or ask for assistance if they were viewing the class simultaneously.

I find it very helpful to work with students on writing assignments in a computer lab setting; I also like to use peer editing sessions for writing assignments. These options aren't available with an online class.

Some students came after class to my office. That rarely happens in regular class.

Their perception is more important

Even though small group peer editing can be done with this delivery technology, I am not able to do the amount of "coaching" I normally do for my written com classes.

I8

The delivery technology offered ample opportunity for me to interact with my students.

interact

Cross off ample and I'd change my answer to disagree.

For many writing assignments, it is helpful if all can look at students' papers while they're "in progress". This is difficult when I don't have any face-to-face contact with the students.

I would rather have face to face with good resolution so that when I see a question on someone's face I can answer it every if they're too shy.

Their perception is more important

With this format, there is no lab component for the class. I do a lot of teaching and coaching in the computer lab, and I missed having this opportunity to interact with my students.

I9

The technology had few or no breakdowns that interrupted my teaching.

interruptions

Students entered wrong session once. I couldn't find the PowerPoint that I know I loaded.

One day I had to record class (in the classroom) with no video because we couldn't get the camera to work. Several students who tried to play back the sessions at home had difficulty with the audio - some couldn't hear me at all during the playback.

Blackboard worked fine overall, except for the difficulty I had accessing the virtual classroom.

Darrel & Roy were excellent helpers.

Few no session was ruined but last session couldn't be digitally processed.

The video connection broke down only once during this segment of the class.

I10

CVTC provided me with good technology support.

support

If we expect teachers to use cutting edge technology, it is necessary to respond immediately. when a teacher asks for help, its usually just before or during class.

The guys from AV were very helpful and accommodating. I see now that I would have benefited from additional training before the unit started. It helped a lot that Tim T. sat in on the recording of my first two sessions.

As always, the technology support was great.

Brian Roy and Darrel were great!

Student problems with the technology were difficult to handle.

The technology support was great. Having a facilitator in the classroom with the students at the beginning of the hour is very helpful. The facilitator distributed papers/handouts and collected assignments. Also, a support person was available during each class session (for the entire hour).

I11

Student achievement in this technology was about the same as it would be for this course content in a traditional class.

achievement

Some students did better. two did much worse, most about the same.

Not being able to look at their assignments in progress reduced the amount of feedback students received.

As the ITV classroom not 4 per week.

If they use it.

Students' grades on the writing assignments are usually better in a traditional lab/classroom setting than in a distance ed. class.

I12

Student retention during this technology was about the same as it would be for this course content in a traditional class.

retention

Lost 1 or two of 20 during this 5 weeks. Last semester started with 145 ended with 109.

I compared students' scores on an objective test from both sections, and the scores were very similar for both groups.

If retention means students don't drop out, agree. If it means they don't forget, strongly agree.

If they use it.

More face to face contact seems to help increase retention for many students.

I13

Student satisfaction with the course content delivered in this technology seems about the same as it would be in a traditional class.

satisfaction

Just by my emails, they were wonderfully tolerant of a poor delivery.

I heard from my students that a few of them liked Centra but the vocal core group hated it. Part of the problem was that students intentionally resigned for a "traditional" class and then ended up with a distance class.

The students in my pilot technologies class did not purposely register for an online class; therefore, many of them were dissatisfied with the online course delivery.

Some didn't like it and spoke with me.

Notice about 1/3 of students went with in class instruction.

Students appeared fairly comfortable with this technology. It helped to have a facilitator in the room at the start of each class to adjust the sound levels.

I14

Overall, the delivery technology provided an excellent teaching experience

overall

I can't teach what I can't see.

I would say it provided a GOOD LEARNING EXPERIENCE for me. I learned how to use a new technology, and I looked at my teaching strategies in a new way.

I liked it. I had to do a little revisions of presentations when trying to share web sites with the students. They did not project well. When possible I put screen slots into my ppt to do the job. I liked being able to see the students - to have the audience visible. I especially liked the flexibility to pre-record.

I think that all things considered, things went ok. This is balancing that the technology is newer and unproven. There's always more headaches with technology. When I started teaching, the worst tech failure was a broken piece of chalk. Now teachers are expected to be tech wizards. it takes a lot of time and dedication to keep up with technology.

Split Class.

I had difficulty with the sound in the classroom sometimes. The microphone picks up voices of the students sitting closest to it, but these same voices frequently made it hard to hear the comments of students sitting farther away from the microphone.

I15

If given the choice, would you use this technology in the future to deliver your course?

use

I would even say presenting any science course with this tech. is professionally negligent.

a different course - I don't think I would want to deliver this particular course via Centra. I can see that other applications of Centra might be more appropriate. For example, I think English Comp. might be a class I would be willing to teach using Centra, although that format would not allow for any peer editing activities.

Yes - I have learned ways to make an online course better/more effective in the future.

Appendix G: CVTC Online survey

On-line learning may not currently be the best alternative for you. Talk to your counselor or advisor.

Comments to consider:

Question 1 - My need to take this course now is...

If your interest in online learning is purely for fun or interest, then perhaps you could try it without much risk.

Question 2: Feeling that I am part of a class is...

Class belonging is possible online, but it takes some adjustment on your part.

Question 3: I would classify myself as someone who...

To succeed online, you must be self-disciplined. You cannot put things off until the last minute.

Question 4: Classroom discussion is...

Online discussion takes place in chatrooms, forums, and email. You may well benefit from online discussions, but it may take some adjustment on your part.

Question 5: When an instructor hands out directions for an assignment, I prefer...

Instructions cannot be explained in the same way that they can in a classroom setting. You will often need to figure out things for yourself or ask nearby friends.

Question 6: I need faculty comments on my assignments...

Comments online most often will not be immediate. You will need to wait for responses from your instructor.

Question 7: Considering my professional and personal schedule, the amount of time I have to work on an on-line course is...

An online course may well take **more** time than a traditional course.

Question 8: When I am asked to use computers, download files, or use other technologies new to me...

Often it will be necessary to learn and use new technology while taking an online course. Try improving your basic computer skills so that you will be more comfortable with new technology.

Question 9: As a reader, I would classify myself as...

Reading ability is important for succeeding in an online course. Most, if not all, of your correspondence with your instructor and class will be via reading and writing.

Question 10: If I have to go to campus to take exams or complete work...

It certainly is possible for you to be a great distance from this campus. In this case we may need to find someone in your locale willing to proctor your testing.

Thanks for your interest. We hope that you will find an option which works best for you.