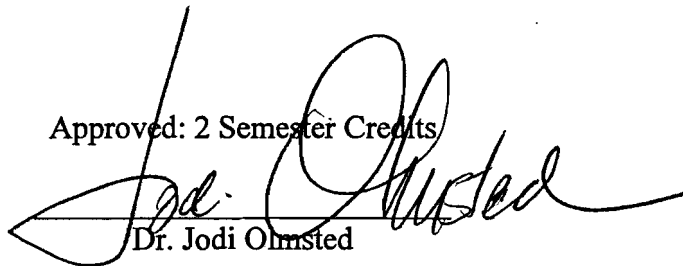An Evaluation of a Laptop Initiative:

Enrollment Implications on the Visual

Communications Program at

Western Technical College

by

Mark S. Davini

A Research Paper
Submitted in Partial Fulfillment of the
Requirements for the
Master of Science Degree
in

Career and Technical Education

Approved: 2 Semester Credits

_____
Dr. Jodi Olmsted

The Graduate School

University of Wisconsin-Stout

May, 2008

The Graduate School
University of Wisconsin-Stout
Menomonie, WI

Author: **Davini, Mark S.**

Title: *An Evaluation of a Laptop Initiative: Enrollment Implications*
             on the Visual Communications Program at Western Technical
             College

Graduate Degree/ Major: MS Career & Technical Education

Research Adviser: Jodi Olmsted, Ph.D.

Month/Year: May, 2008

Number of Pages: 47

Style Manual Used: American Psychological Association, 5th edition

ABSTRACT

Video production, motion graphics and multimedia are ever changing fields, and the tools for creating materials are becoming more powerful. The pace of change is becoming fast enough that two-year college budgets can no longer sustain the increasing costs of keeping up-to-date with state-of-the-art equipment.

Western Technical College in La Crosse, Wisconsin is a two-year college serving a seven county district in the western Wisconsin area. The Graphics Department, which includes Visual Communications (Vis-Com) and Graphic Design (GD), is contemplating a laptop initiative for all incoming students. Many four-year colleges have successfully launched similar initiatives, but what are the implications for enrollment at a two-year college? This study sampled first, second and third year Vis-Som/GD students' perceptions on current computer accessibility, possible implementation of a laptop

initiative, and how it would affect their quality of education. Students were asked to complete a survey to evaluate the perceptions mentioned here. An analysis of data suggested younger students felt a laptop would improve the quality of their education and are more willing to enroll in a mandatory laptop program, particularly if software and financial aid are available to help with costs.

Acknowledgments

I would like to thank the people from the University of Wisconsin-Stout, and especially Jodi Olmsted for the patience, help and assistance provided to me. I am honored to be an instructor at Western Technical College and offer my thanks for the participation of the students, staff and colleagues involved with the survey. I would also like to thank my wife Barbara and all of my family members for their support and backing throughout this educational journey. I would also like to thank Rich Westpfahl, my dean, and Jacob Griggs, my friend, colleague, and support person at Western.

TABLE OF CONTENTS

List of Tables

Chapter I: Introduction

Background

As computer use continues evolving in the classroom, computers become essential

components for obtaining an education (Klinger, 2004). There are growing numbers of

colleges offering laptop programs including the University of Minnesota-Crookston,

University of Wisconsin-Stout, Wake Forest University, and Winona State University

(University of Minnesota-Crookston, 2006b). The Graphics Department at Western

Technical College (Western) is also contemplating a move toward a laptop initiative.

This technology allows students to communicate frequently with professors and

classmates, engage more fully in class activities, and access worldwide databases. These

opportunities allow students to acquire competence in technologies that are shaping every

profession and vocation as well as public life (Wake Forest University, 2005). While

there have been a number of studies exploring different aspects of Educational Laptop

initiatives, many have focused on wireless connectivity, Internet access, and

communication within the college or university as a whole (Penuel, 2006). There seems

to be fewer studies that have looked specifically at program enrollments.

"Ubiquitous computing" is a term attributed to Marc Weiser from Xerox Palo

Alto Research Center (PARC) in 1987 (Weiser, Gold, & Brown, 1999). The term

ubiquitous computing was used to refer to the computing experience yet to be, where

digital technology was so integrated into campus activities that it would be nearly

invisible (Finn & Inman, 2004). "One to one" laptop initiatives, which grew out of that

original vision, provide that all students have individual access to computers at any time.

Penuel (2006) said

"An ubiquitous, 24/7 approach makes it possible for students to access a wider array of resources to support their learning, to communicate with peers and their teachers, and to become fluent in their use of the technological tools of the 21st century workplace," (p. 332).

The assumption behind most ubiquitous computing initiatives has been that mere access to technology would lead to its direct usage (McVay, Snider, & Graetz, 2005). Dr. Barbara Prindiville, former Vice President of Instruction at Western, feels that access to computers can be critical at the technical college program level for completing the increased general studies requirements associated with Associate of Applied Science (AAS) degrees (B. Prindiville, personal communication, September 26, 2005). The Wisconsin Technical College System (WTCS) recently added more general studies requirements for AAS degrees, which allows students less time with program specific software. A laptop initiative can effectively provide greater access to program specific software.

Various studies have focused on one to one initiatives and wireless Internet access (Penuel, 2006), learner outcomes, or "best technology practices" by modifying curriculum to incorporate electronic portfolios as evaluation mechanisms (Corwin, 2003).

Research has not yet provided policymakers enough hard evidence of the benefits and costs of one to one initiatives to ascertain whether they are worth what they cost, or if these initiatives are more or less effective than more standard practices, (Zucker, 2004, p. 372).

Some studies mention the higher cost of education due to the laptop programs that initiate "technology fees" of $500 per semester (McVay et al., 2005) up to $7,200 for a

three-year graphic design program (Hamilton, 2003). There is still a relatively small amount of data addressing initial student resistance or acceptance of one to one initiatives, or whether the added cost or program competencies creates a digital divide that might effectively prohibit certain groups from attaining an education (Finn & Inman, 2004).

In its initial development, one of the four pilot departments of Winona State University (WSU) estimated a 10 – 20% initial drop in student enrollment, while another found their students were generally dissatisfied since they already owned desktop personal computers (McVay et al, 2005). In light of the fact that WSU is a four-year institution, attitudes might be similar — if not amplified — in a two-year college setting, since one of the main factors that attract students to a two-year college is traditionally lower tuitions. Currently, there is little data available at the two-year college level since implementing these initiatives on those campuses is still relatively new.

Western is a two-year technical college established in 1912 in La Crosse, Wisconsin. It offers degree and certificate programs through a variety of modalities, while serving a seven county district around La Crosse. In an effort to support students' needs, the Graphics Department at Western, including the Visual Communications (Vis-Com) and the Graphic Design (GD) Programs are outfitted with cutting edge equipment. While the GD program includes five 16 station classrooms and one computer lab, Vis-Com has only one 12 station lab. As the enrollment of this department grows, economic and space limitations make the development of additional computer laboratories more challenging.

The Graphics Department is contemplating implementation of a mandatory laptop program for both the GD and Vis-Com Programs. This would address two issues: 1) maintaining a competitive edge by providing the highest quality education possible for its students, and 2) proactively addressing the limitations of physical space.

Statement of Problem

Western Technical College is proposing a mandatory laptop initiative for the Graphics Department. No data currently exists in relationship to student interest, satisfaction, or potential barriers to enrollment. Will enrollment in the Vis-Com Program at Western Technical College be affected if tuition is increased due to a mandatory laptop initiative? What other impacts will there be on enrollment?

Purpose of Study

The purpose of this study is to determine potential impacts on student enrollment and costs within the Western Vis-Com Program if a laptop program were initiated. Data collected will guide the decision-making process in relationship to implementation of a laptop program.

Objectives of the Study

The research will address the following objectives:

1. What are the perceptions of students regarding the possible laptop roll out in the Vis-Com Program?

2. Are there different student perceptions regarding a laptop roll out between GD and Vis-Com?

3. What are the differences in perceptions regarding the laptop roll out based on student satisfaction, quality of education, and access to software?

4.   Are there any correlations between the length of time in the program (number of

years at Western) and views of a laptop initiative?

Definition of Terms

The following is a list of terms to be used in the study, and definitions may vary

from other sources. These definitions were chosen because they provided the most

concise definition for the purpose of this study.

Laptop. a portable, usu. battery-powered microcomputer small enough to rest on

the user's lap. (Dictionary.com, 2008)

Multimedia. An extension of hypertext allowing the provision of audio and video

material cross-referenced to a computer text (Oxford English Dictionary, 2007)

One to one (1 to 1). An initiative to make technology pervasive – always

available. Both students and educators are provided portable machines with wireless

access to the Internet in addition to productivity and word processing software. The

"laptop for every student" concept is changing how, when and where students learn,

(Apple, 2006, para. 3).

Ubiquitous computing. How computers are embedded within the complex social

framework of daily activity, and how they interplay with the real world (Weiser, 1999

para. 2). It considers the nuances of the real world to be wonderful, and aims only to

augment them. Unlike the intimate agent computer that responds to one's voice and is a

personal friend and assistant, ubiquitous computing envisions computation primarily in

the background where it may not even be noticed. Promoters of this idea hope that

embedding computation into the environment and everyday objects would enable people

to move around and interact with information more naturally and casually than they currently do.

Visual communications.

The communication of ideas through the visual display of information. Primarily associated with two-dimensional images, it includes: art, signs, photography, typography, drawing fundamentals colour and electronic resources. Recent research in the field has focused on web design and graphically oriented usability. (Wikipedia, 2006, para. 1)

Graphic Design. The practice or profession of designing print or electronic forms of visual information, as for an advertisement, publication, or website, (Dictionary.com, 2008).

Limitations of Study

The study may be limited by the following factors:

1. The survey will be conducted within the La Crosse area and may not include a large population of students. Students in the La Crosse area are not necessarily reflective of the perceptions of other students in different geographic locations.

2. The study will only look at the perceptions of students and will not focus on business or industry or four-year institutions for input.

3. The conclusions to this study will be limited. While the findings may be useful to others, the information is directed specifically toward the Western Graphics Department.

4. As the results will be compiled from a survey, it is assumed that the response rate will be less than 100%.

5. The survey itself may not measure intended data.

6. Returned surveys may be incomplete.

7. The time of the semester in which the survey is given may have an effect on

results.

Chapter II: Literature Review

This chapter will outline adult learners and their needs, the field of video and multimedia creation and the rapidly changing technologies within. The literature review will include information outlining various laptop initiatives from educational institutions in the Midwest and the challenges faced in balancing cost and quality of service. The review will also consider cost implications and structure of various laptop initiatives. The chapter will conclude by exploring the impacts on enrollment on both two-year and four-year campuses.

Adult Learners

Adult learners come to the classroom with a wide range of aspirations, desires, backgrounds, aptitudes and abilities. "The core principle that adults 'need to know why' before they engage in learning has led to the now generally accepted premise that adults should be engaged in a collaborative learning process for their learning" (Knowles, Holton & Swanson, 1998, p. 133). These learners often enter the classroom with a desire to share control of program facilitation and content. Others enter with a great deal of anxiety, self-doubt, insecurity and fear. These students have special needs that must be addressed if they are to succeed (Hinds, 1999). Of the many significant considerations necessary to address, one is the issue of time. Time management is a serious issue for adult learners, who often balance work and families while in school.

Having had to "give up time with the family" and "letting things slip," or "my social life has gone out of the window" were frequently voiced from men and women alike and these often dominated the interviews. Those committed to volunteer work found it equally hard to cope, (Arthur & Tait, 2004, p. 4).

Another significant issue that adult students contend with is educational cost. Tuition fees are a significant factor in the choice of education made by these students. Since the burden of finance is often placed on the student, loan repayment arrangements are of utmost importance (Schuetze & Slowey, 2002). What impact will the added cost of a laptop computer have on a student's decision to enter into a two-year college?

Most traditional students entering college firmly believe in a pedagogical learning model where failure for learning rests solely with the instructor. It is the learning model that most traditional students have experienced for their entire lives. Andragogical learning primarily focuses on learners accepting responsibility for their own successes and failures. This model is more applicable in college settings where the learner is more actively engaged in his or her own learning (Hill, 2001). Knowles et al. (1998) contend that autonomous learning in an andragogical environment should be the focus of all higher education. Adult education should become an environment of self-direction and learner-centered activity that incorporates the learner's life experiences with available learning resources. While the goal is to foster a self-learning environment, the technical nature and broad scope of Vis-Com is daunting. A mix of pedagogical and andragogical learning models offers a good mix of what is important to learn and also how it can be learned (Cranton, 1992).

The field of Vis-Com involves concepts, tools and software that may not be known to a number of learners or those who may only have a vague idea of what Vis-Com means. Those learners take a more pedagogical approach to learning since the content is so foreign to them. Unlimited access to the tools with which to create content may be the very thing students need in order to foster a more andragogical learning style.

Visual Communications

Visual communications as a multimedia field has undergone vast and significant changes. It was only within the past 15 years that digital video on computers as a medium emerged as a technological innovation in the field of multimedia. Video compression codec (compressor/decompressor) software such as MPEG-2 (compression used to fit movies onto a DVD), and MPEG-4 (compression used to transmit video files via Internet) have been ratified, while MPEG-7 and MPEG-21 are already under consideration. Video editing using computers and software-based timeline editing also emerged in the early 1990s, effectively changing the way industry manipulates moving images and sound. Since then, video and multimedia have merged to form a synergistic relationship in presenting content via computers. The term "multimedia" has transformed in meaning from computer-based information using text, photographic images and graphics, audio and video into something akin to the mythological, multi-headed Hydra where its meaning is often determined by some immediate context in isolation from its source (Gonzalez, Cranitch, & Jo, 2000).

While it is possible in larger four-year liberal arts institutions to focus on theoretical frameworks rather than actual software application, the traditional concept of technical colleges has been preparing students for employment in local communities using equipment, knowledge, and skills they develop in the classroom and laboratory. The Vis-Com Program at Western centers on software based video editing and image manipulation. Western is serving more and more minority students, and many of those can be resistant to technology due to fear, lack of exposure low reading skills and other factors (Davis, 2006).

Multimedia

As the television industry moves to high-definition, the costs for re-tooling facilities are substantial (T. Sibenaller personal communication, February 28, 2008). Delivery methods for multimedia content are also changing with the advent of devices such as portable DVD players, Sony's PSP, Apple's iPhone and iPod with video, or Creative Lab's Zen Vision. The continuing high costs of computers, cameras, software and other peripherals put an unsustainable burden on the operational budget of Western.

From the College's standpoint, a laptop initiative implemented in the Vis-Com program at Western would have a positive impact on the program's ability to remain competitive with other colleges in today's rapidly evolving technological world. By shifting the burden of computer purchase and maintenance to the student, the program could concentrate on other technological aspects of video production, such as purchasing equipment for acquisition and output of high-definition content, high-resolution still cameras, high output LED lighting kits, as well as emerging software applications that take advantage of chroma-key features such as green screen. The ability to focus on these areas will help students by providing them with cutting edge technology and the ability to create Blu-Ray digital portfolios.

Many adult learners have jobs that take up much of their time during the weekday evening hours. Currently, these students must adjust their schedules to provide larger blocks of time needed to do high quality video capturing and editing in our computer laboratories. Render time of motion graphics and visual effects can tie up a machine for several hours. "The computers are tools in the classroom, they are not the classroom" (Trotter, 2000, p. 2). A personal laptop computer containing the appropriate software

would be a valuable productivity and communication tool for students not only during their education, but in the workforce as well. It aids both autonomy and andragogy by providing the learner with the hardware and software they need when they need it, effectively giving them much more access to their assignments, tools and peer to peer communication in order to complete their coursework. Students can complete coursework, post to a social networking site, and receive feedback from other students at any time of day.

Laptop Initiatives

Goals of educational institutions in relation to multimedia education. Traditionally, a major goal of colleges and universities has been providing students with an intellectual culture and empowering them to develop critical thinking and creative problem solving skills, allowing them to adapt to rapidly changing work environments. Turnover of the physical hardware tools and equipment in multimedia can be as little as two years. Students need to develop the mental processing skills required to troubleshoot and problem solve, and more importantly be able to rapidly activate new technologies in their fields as they are developed (Gonzalez et al., 2000). Equally important is equipping students with both the intellectual and physical tools necessary to work immediately and effectively upon entering the workforce, either on their own or as team members.

Four-year liberal arts systems. Much of the data available for implementation laptop initiatives is limited to four-year institutions, where it is frequently a college-wide initiative. The University of Wisconsin-Stout initiated a pilot laptop program in 2002, which required all new freshman students entering during the fall semester to have either an iBook or a PowerBook (Griesbach, 2003). Initial data from student surveys conducted

indicated that almost half of the respondents expected to use their laptop computer for schoolwork. The world of communications has changed significantly during the past four years, with video over Internet Protocol (VoIP). Internet television is also quickly becoming commonplace. Computers today have faster processors, built-in wireless connectivity, and on-board audio and video equipment to sustain VoIP conferencing. With multimedia communications changing so rapidly, it is quite possible that tomorrow's graduates will be collaborating with individuals globally located at significant distances to create diverse multimedia content.

Two-year technical and community colleges. The Wisconsin Technical College System (WTCS) has restructured the criteria needed for Associate of Science degrees within the state. The addition of more general studies courses reduces the amount of program specific courses that can be offered. Instructors no longer have as many course hours available with students in their field of study. Considering this additional constraint, it is more important for colleges at the two-year level to get software tools in the hands of students as much as possible (B. Prindiville, personal communication, September 16, 2005).

Waukesha Community Technical College (WCTC) currently offers reduced rates on laptops (Appendix A), and the Graphics program within WCTC is "enthusiastically suggesting" their use. Terry Rydberg, a graphics instructor at WCTC, outlined how their laptop program works. They simply mandated a base-level computer system, decided on a core level of processing power required, hardware specifics and software requirements and made it the policy that students who enter must have a laptop that conforms to these standards (T. Rydberg, personal communication, April 17, 2007). The results have been

positive, with the addition of the laptop and software purchase adding another level of educational commitment to students in the WCTC Graphics Program.

Western Technical College. In order to effectively implement a quality initiative, network infrastructure needs to be in place. The cost of updating to wireless networking may impact the laptop program. However it is just as possible that a smaller lab could serve the needs of students, which would lower hardware purchasing costs and software maintenance costs. Because of these considerations, it is important to pilot test on a smaller scale before considering further deployment options. Since the Western Graphics Department utilizes Apple hardware and software, partnering with a major hardware/software company such as Apple computer might aid in instituting significant cost reduction by setting up pricing, financial arrangements and incentives, maintenance and technical support. If the program is successful, other partnerships could be explored. Other options might include the Western PC Service Center becoming a certified reseller of Apple, offering training programs using Apple software. There are also independent companies that specialize in Apple products in the La Crosse area as well. These businesses offer computer sales and service and have had partnerships with educational entities in the past. A pilot study will likely be more successful if the professionals at Apple or other organization offer high quality technical and educational support to the students that use the laptops such as training and replacement machines. If a pilot study were successful, the GD Program may also be included in further implementation.

Planning is very important with large initiatives such as this. In order to get this on the executive planning agenda by 2009, initial studies should begin as early as the spring of 2007, and no later than the spring of 2008. Local partnerships must be

established with the Graphics Department and Western's PC Services at the earliest opportunity in order to build a strong level of communication with the college.

Rising costs of computer hardware, software and peripherals needed in multimedia creation (T. Sibenaller personal communication, February 28, 2008), combined with limited space available for laboratories (P. Albrecht, personal communication, July 17, 2007) put an increasing burden on the Vis-Com program at Western Technical College. There is still a fundamental question that needs to be addressed: will students attend Vis-Com at Western if a laptop initiative is implemented? In order to answer this effectively, data needed to be collected regarding students' perceptions of what a laptop program would mean to them and what impacts it might have on the learner. Student perceptions on whether there is adequate access to computers in laboratories at the present time and if they feel that more access to computers and software would be beneficial in their education need to be determined. It is also important to understand whether computer operating system (Apple Macintosh or Microsoft Windows) is an important issue for students, and whether unfamiliarity with a particular operating system may negatively influence students' views toward the laptop and, therefore, their willingness to enter in the program.

Chapter III: Methodology

This chapter explores the student population in the GD and Vis-Com programs at Western, the instrumentation used and its construction, data collection procedures, and data analysis.

Subject Selection and Description

The Western GD/Vis-Com programs serve the district of western Wisconsin, including La Crosse, Mauston, Independence, Viroqua and outlying communities. Students living in these areas that are interested in a career in GD or Vis-Com are the target population for this survey. The Graphics Department is interested in gaining insight into the population of this seven county district regarding the interest of a laptop program. An appropriate sample of current first, second and third year GD/Vis-Com students will provide an adequate sample of this population.

A cluster sample was chosen due to its ready availability. The subjects chosen for this study were students from the Western Graphics Department, which includes GD and Vis-Com. Many students finish a degree in one program and continue in the other, earning Associate degrees in both fields and making themselves more marketable.

Visual Communications accepts 24 students per year into its program, while Graphic Design accepts 60 students. Vis-Com averages about 12 to 18 second year students and GD retains roughly 40 to 45. Some students drop the program, while others take longer than two years to complete. There are between 150 – 200 students enrolled in the two programs of interest throughout the year. This survey was given to both first, second and third year students. Some students prefer to take only 12 credits per semester and are on a three year track, and may have some interesting viewpoints regarding computer accessibility.

Instrumentation

The survey was created specifically for this study, and reviewed by the Vis-Com and GD instructors to insure content validity. The findings are limited in scope and interest to Western's Graphics Department faculty. The instrument is a quantitative style survey, which utilizes a four-step Likert scale of measurement, from strongly agree (1) to strongly disagree (4). Other data such as sex, age and yearly income is also set up with groupings in a Likert fashion.

Questions were created in an attempt to gain insight into the student mindset without predisposing the student in one way or another. Faculty provided input which was incorporated into the final survey instrument. In the initial faculty meeting prior to implementation of the survey on September 4th, 2007, it was determined that the survey administrators would ask students to indicate their program and year in the upper right-hand corner of the survey but not their names, and to make sure students knew this was completely voluntary and anonymous.

The survey was broken into four sections: Student views regarding current computer accessibility, computer platform, technical support, and limited demographic questions. The students were asked upon receipt of survey to include their program and year. For example, a second year GD student would place a G-2 in the upper right hand corner of the survey. The survey appears to have face validity and content validity.

Data Collection Procedures

A 16-question survey was administered in paper form to make it easier for students to respond. In addition to some simple demographics, the core of the survey

explored students' feelings toward a laptop initiative. Students were asked to provide

their year in the program, from a VC 1 to VC 3 for Vis-Com, G-1 to G-3 for GD

Ninety surveys were submitted during normal class periods within the fall session

of classes from September 10th through September 28th of 2007. First and second year

GD and Vis-Com students were notified and asked to participate. They were informed

that participation was completely voluntary and if they did not wish to participate, they

could simply return the blank survey. Instructors who implemented the survey were to

give students information regarding the voluntary nature of the survey, the reasons for the

survey, how the information would be used, to include their program and year in the

upper right-hand corner of the survey but not to include their name. Instructors informed

students that pertaining to question 2 of the survey, the assumption was that the software

is available to them at all times. It was also asked whether a student would attend the

program if it was mandatory they buy a laptop.

Data Analysis

A number of statistical analyses were used in this study. Data was analyzed to

find out whether there was a correlation between a student's income, gender, age, and

the willingness to purchase a laptop for the program. The Statistical Package for the

Social Sciences, version 15.0 (SPSS, 2006) was used to analyze the data. Another part of

the analysis focused on determining the experience level on a given platform and a

student's comfort with the technology. Question five of the survey focused on the core

willingness of students' to enroll in the GD or Vis-Com programs at Western if doing so

meant they had to buy a laptop. Other areas of interest included whether there was any

correlation between students' willingness to enroll in a program that mandated laptop

purchase and any other measurable variable set up by this survey as well as whether the opinions of students change over time with more exposure and experience with the Apple platform.

The current accessibility of Western's computer laboratories was also analyzed. Vis-Com has additional needs since some of the software is specific to this lab of 10 computers. Therefore, data was compiled separately for both Vis-Com and GD students. Since the Vis-Com program is rather small, and the GD program is also interested in the possibility of a laptop program, GD data will be included but kept separate.

Because this study looks for a correlation between student enrollment and willingness to purchase a laptop, the Pearson correlation method of data analysis was used with SPSS. Data was broken into groups including gender, age, income, and year in program, when provided.

Limitations

Since the instrument was developed specifically for this study, significant information may have been missed and therefore not gathered.

The time in which the survey was given may have an effect on student views. If the survey was given closer to the end of the semester when computer use is at a higher level for both first year and second year students, students might see a benefit in having their own laptop.

Students who were taking courses in the graphics area of instruction such as Adobe Photoshop might take the survey even though they are enrolled as Vis-Com students. Unless clearly marked on the survey, it would be impossible to tell in which

program the student was enrolled. If a student chose to take the survey multiple times, the data could be skewed.

Scheduling conflicts prohibited single-instructor administration of the survey and may have affected the quality or completeness of information students were given. Portions of the instructions may not have been disseminated properly or at all.

Chapter IV: Results

The Western Technical College Graphic Design (GD) and Visual

Communications (Vis-Com) Programs are considering the implementation of a laptop

initiative but are concerned with the effects this may have on student enrollment. In order

to gain insight into this question, a 13-item survey was given to a sample population of

the students served during the fall semester of 2007. The survey was given to all Vis-

Com students, and roughly two thirds of the GD students. Even though the two programs

are combined, it was important to keep the data separate since the focus of this research

was primarily on Vis-Com.

The results were compiled using Pearson correlation analysis between each

component of the survey. There were 83 people who responded to the survey; 35 from

Vis-Com, and 48 from GD. Correlation analyses were run on program, gender, age,

income, and year in program. Following are the results of the analysis from the original

survey. Questions refer to the thesis objective questions, and items refer to the individual

survey instrument items (See Appendix B).

Vis-Com attracts more returning adult students than does GD. Tables 1 and 2

present demographic information of current students in both the Vis-Com and GD

Programs at Western. Table 1 indicates that the highest number of Vis-Com students

(55.9% or 19 students) are between the ages of 17 – 20. The 17 – 20 age group also

contained the highest number of GD students (63% or 29 students). According to Table 2,

male Vis-Com students outnumber females by almost 2:1, while over half of all students

are female in the GD program. The ratio is nearly even between males and females when

considering both programs together.

Table 1

Ages of Participants by Program

Program	17-20	21-25	26-30	31-35	36 +	Total
Vis-Com	19	9	5	0	0	34
	55.9%	26.5%	14.7%	0%	0%	100%
GD	29	12	3	1	1	46
	63.0%	26.1%	6.5%	2.2%	2.2%	100%
Total	48	21	8	2	1	80
	60%	26.3%	10%	2.5%	1.3%	100%

Table 2

Gender of Participants by Program

Program	Male	Female	Total
Vis-Com	23	12	35
	65.7%	34.3%	100%
GD	20	27	47
	42.6%	57.4%	100%
Total	43	39	82
	52.4%	47.6%	100%

Research Objective Questions

Question #1: What are the current perceptions of students regarding the possible laptop roll out in the Vis-Com Program? All students from both programs answered this question, however there was not quite the same level of agreement. While over 95% of the GD students felt that there was ample access to computers currently, Vis-Com students agreed by a more modest 88.6%. There was a relationship between survey item 1, current accessibility to computers and question 6, willingness to attend the program if the computer ran Windows. The results showed statistical significance at the .05 level between these items regarding accessibility and the Windows operating system and can be seen in Table 3. This was the only significant finding regarding current computer accessibility.

Table 3

Correlation between Accessibility, Usefulness and Platform

Survey item	Correlation	Item #01 There is ample accessibility to computers to do my assignments
03 "A laptop would be useful in this field when done with school"	Pearson Correlation	.255
	Sig. (2 Tailed)	.020*
	N	83
06 "I would attend if the computer ran Windows"	Pearson Correlation	.272
	Sig. (2 Tailed)	.016*
	N	78

* < .05

Question #2: Are there different student perceptions regarding a laptop roll out between Graphic Design and Visual Communications? There were two main areas that would effectively address this core study question.

Survey item 5 asked "Would you attend this program if it were mandatory you purchase a laptop?" At the program level, the results of a two tailed significance indicated there was a strong level of significance between a mandatory laptop initiative and access to software (.003), quality of education (.005), benefit of owning a laptop after their education was completed (.001), and access to computers (.004). Another area that addresses the issue of perception is item 9: *"I would attend this program if financial aid were available for laptop purchase"*, which showed statistical significance at the .05 level. Using a T-test, significance at the .05 level for Vis-Com over GD, and significance at the .01 level on item 02 *"I would use software more if it were more available to me"* Was observed. The Vis-Com students had higher mean response levels than did respondents from GD, as shown in Table 4.

Table 4

Ubiquitous Usage and Financial Aid

Survey item	Program	N	Mean	Std. Deviation	Std. Error Mean
2: I would use the software more if it were always available to me	Vis-Com	33	3.67*	.479	.083
	GD	47	3.17	.524	.076
9: I would attend this program if financial aid were available	Vis-Com	35	3.69**	.471	.080
	GD	48	3.40	.676	.098

* < .001

** < .05

Question #3: What are the differences in perceptions regarding the laptop roll out based on student satisfaction, quality of education, and access to software? Forty percent of the respondents in Vis-Com were first year students, 46.7% were second year, and 13.3% were third year students, with five people not responding to this item. All Vis-Com students responded to the item regarding computer accessibility and 88.6% indicated they thought there was ample accessibility currently.

Respondents agreed or strongly agreed as shown in Table 5 that they would use software more if it were available to them, and a laptop would be useful in the field upon graduation. They also indicated that it would improve the quality of their education, and that they would attend the program if it were mandatory they purchase a laptop.

Table 5

Mandatory Laptop question by Program

	Strongly Disagree	Disagree	Agree	Strongly Agree	Total
Vis-Com Count	0	8	13	12	33
% within Program	.0	24.2	39.4	36.4	100
GD Count	3	10	25	10	48
% within program	6.3	20.8	52.1	20.8	100
Total Count	3	18	38	22	81
% within Program	3.7	22.2	46.9	27.2	100

Over 75% of the respondents in the Vis-Com program stated they would attend

the program if a laptop were mandatory, while only 72.9% of GD students indicated they

would attend.

The issue of computer platform was relatively even between both programs. Table

6 shows that at least 90% of students would attend if the computer ran Mac OS, with

about 60% saying that the platform was not an issue for them.

Table 6

Operating System by Gender

Item # 07	N	Mean	Std. Deviation	Std. Error Mean
Would you attend this program if	39 males	3.49	.506	.081
the laptop ran Mac OS?	38 females	3.21	.622	.101

The column on the left of Table 6 shows the item on the survey, and its survey

item number. The next column refers to the gender of the respondent, "N" is the number

of students that answered the item, followed by the mean, standard deviation and

standard error mean.

Question #4: Are there any correlations between the length of time in the

program (number of years at Western), and views of a laptop initiative? Because there

were three age categories, the data had to be processed differently for this category. The

data was significant in relation to the age of the student on a number of questions in the

survey. The youngest students felt that there was ample access to computers. There was

significance at the .05 level when using a multiple range test within the age category on

items 1, 5, and 7. The Duncan multiple range test was given in these groups, and found

that students in the 17-20 age category showed higher statistical means regarding

accessibility, mandatory laptop purchase, the two operating systems items indicating they

were more likely to attend the program if it were mandatory they buy a laptop running the

Mac OS. This data can be seen in Table 7.

Table 7

Survey Item number	Age category	N	1	2
01	0	8	13	12	33
% within Age	.0	24.2	39.4	36.4	100
05	3	10	25	10	48
% within age	6.3	20.8	52.1	20.8	100
07	3	18	38	22	81

% within age	3.7	22.2	46.9	27.2	100

Survey item 6 *"The operating system does not matter to me"* had practical

statistical significance, but it would seem that the concept of the laptop running the

Windows operating system was not a significant factor in students' willingness to attend.

Item 10 *"I will buy the laptop the program recommends"* was another area where the

Duncan test showed some variance, but did not provide significance at the .05 level.

Chapter V: Discussion

In order to obtain more information regarding the effect on enrollment in the

Visual Communications program at Western Technical College if a laptop initiative were

implemented, a survey was given to first, second and third year students during the fall

semester of 2007. The data was analyzed using SPSS, version 15.0 using Pearson

Correlation coefficient. The results showed some statistical significance between the

laptop initiative and educational success in the minds of the students. What follows is a

summary of the limitations of the study, conclusions, and recommendations.

Limitations

The study was limited by the following factors:

1.   The survey was conducted within the La Crosse area and did not include a large

       population of students. Student perceptions in the La Crosse area are not

       necessarily reflective of the perceptions of other students from different

       geographic locations.

2.   The study only looked at the perceptions of currently enrolled students and did

       not ask business, industry, prospective students or four year-institutions for input.

3.   The conclusions to this study are limited. While the findings may be useful to

       others, the information was directed specifically toward the Western Graphics

       Department.

4.   As the results were compiled from a survey, it was assumed that the response rate

       was less than 100% of all students in the program.

5.   The survey itself may not have effectively produced the desired results.

6.   Some surveys were incomplete.

7.   The time of the semester in which the survey was given may have had an effect

on results.

Conclusions

Question #1: What are the current perceptions of students regarding the possible laptop roll out in the Vis-Com Program? There was a statistically significant finding regarding the current access to computers and the willingness to attend if the computer ran Windows, but there was no other significant data regarding this issue. It is perhaps possible that first year students may have interpreted the question based on their current course load including general studies courses, which utilize the Microsoft Office Suite software package and therefore can be done in virtually any lab on any campus. There are ample computer laboratories and classrooms available to students at many times of the day, including Saturdays. However, this does not address the issue of more Vis-Com program specific applications such as audio or video editing software requiring access to the Vis-Com lab and server. Access to this lab is maintained from 6:00 AM to 10:00 PM , Monday – Friday via an electronic I.D. access card. College employees are available in the lab area for much of that time, but security is a significant issue if students are in the lab by themselves.

The Graphic Design program houses five 16 seat computer classrooms, and an open access computer lab. It is possible that GD students may feel there is ample access to computers currently.

Question #2: Are there different student perceptions regarding a laptop roll out between Graphic Design and Visual Communications? All students felt that their quality of education would be higher if a laptop were available to them, which concurs with the

general findings in previous studies outlined earlier in this paper (McVay et al., 2005). The lack of program year data for some of the Graphic Design survey respondents was unfortunate, since it would have been interesting providing data from students that had more long-term exposure to the program.

Some data suggested Vis-Com students would use the software more if it were more available to them, and if financial aid were available for purchasing the required hardware and software. The current Vis-Com lab consists of 12 computer workstations where students are able to capture and monitor audio and video using all of the peripheral A/V mixers, monitors and other equipment. The Vis-Com curriculum also continually builds on what the student has already learned in previous semesters. Even though students may focus on video assignments, there is still a need to address the musical, audio and animation portions of the complete assignment, which are taught during different semesters. For this reason, Vis-Com student assignments often require a great deal of additional computer access in order to complete this synthesis of software packages into one coherent audio/visual piece. As the semester continues, the assignments become even more complex with greater computer image rendering time. It is quite possible that if the survey were given toward the end of the semester when students need to finish assignments, a very different result might be found.

Question #3: What are the differences in perceptions regarding the laptop roll out based on student satisfaction, quality of education, and access to software?

The youngest respondents were the most open-minded to the idea of a laptop initiative, regardless of the operating system. Statistically, they were more likely to attend even if it were mandatory they purchase a laptop. The data showed results that were close

but not quite significant, indicating that the students may not buy the laptop the program endorses. There could be a variety of reasons for this, including parents being quick to purchase a laptop as a high school graduation present. Most current students find the computer platform WTC uses to be a very smooth, tightly integrated system, and show enthusiasm while using it. This would suggest an important issue to keep in mind when advising students prior to enrollment to make sure they purchase the proper laptop.

Question #4: Are there any correlations between the length of time in the program (number of years at Western), and views of a laptop initiative? There were no significant findings that came from this study to indicate any correlation from the student's year in the program and a laptop initiative. The students that felt a laptop would be a useful tool in the workplace, also felt that 24/7 exposure to the software would result in better education and higher student satisfaction, but there was no statistical evidence identified supporting this.

Recommendations

Recommendations would include revising the survey instrument for a more accurate measure of program specific software and making sure the program and yearly data are included. The administration of such a survey should also be more controlled for a higher level of consistency in dissemination of information to students that will be surveyed. The time the survey is given may be changed to later in the semester, after students have had more time to have access to the computer laboratories with program specific software.

Considering the results of the survey in regard to the age groups of students, another recommendation would be to do a pilot study two years in length. One pilot

group of first-year students could be advised prior to acceptance, and required to purchase a laptop that met specifications recommended by the program instructors. Tracking of students during their tenure and post-graduate surveys could provide information on student success, quality of education, use of the computer in the workforce, and quality of student work within the degree, as well as other factors. It may be that students who have more access to the software produce higher quality multimedia assignments and digital portfolios, which could result in better initial job offers upon graduation.

If a laptop initiative were fully implemented, the college could see some direct benefits as well. With every student owning a computer, the Vis-Com program could maintain a much smaller lab for special projects. Currently the Vis-Com lab has 12 computer workstations with the highest processor speed available in order to render high quality multimedia. If every student had a laptop capable of creating high-end audio and video projects, the college could maintain a much smaller lab of perhaps six or eight machines. This would still make it possible to work together with other colleagues as we move to high definition television, while saving money on machines, software and maintenance. The dollars saved in maintaining a larger lab with computers and software could be redirected to purchasing additional cameras or other equipment needed for field video production. Having this state of the art equipment such as HD cameras could attract more students from around the state.

References

Apple, Inc. (2006). *1 to 1 learning.* Retrieved June 30, 2006, from

www.apple.com/education/k12/onetoone/

The American Heritage Dictionary. (2006). laptop. (n.d.). *The American Heritage®*

Dictionary of the English Language, Fourth Edition. Retrieved April 28, 2008,

from Dictionary.com website: http://dictionary.reference.com/browse/laptop

Arthur, L., & Tait, A. (2004). Too little time to learn? Issues and challenges for those in

work. *Studies in the Education of Adults, 36*(2), 222-234. Retrieved April 7, 2007

from the Academic Search Elite database.

Corwin, T. (2003). Electronic portfolios. *Campus-wide Information Systems, 20,* 32-38.

Cranton, P. (1992). *Working with adult learners.* Toronto, Ontario, Canada: Wall &

Emerson, Inc., Publishers

Davis, D. (2006). The age of insecurity. (Vol. 41 Issue 1, p178-197, 20p). Latin

American Research Review. Retrieved April 11, 2007, from Academic Search

Elite database.

Finn, S., & Inman, J. (2004). Digital unity and digital divide: surveying alumni to study

effects of a campus laptop initiative. *Journal of Research on Technology in*

Education, 36(3), 297-317.

Gonzalez, R., Cranitch, G., & Jo, J. (2000). Academic directions of multimedia

education. *Communications of the ACM, 43*(1), 89-95. Retrieved December 04,

2006 from the Academic Search Elite database.

Griesbach, B. (2003). An action evaluation of UW-Stout's laptop implementation: Global

    Student Expectations and Microsoft Office Competencies the First Year,

    Unpublished Master's Thesis, University of Wisconsin – Stout, Menomonie

Hamilton, T. (2003, June 16). Art school's laptop plan plain ugly; Costly laptop lease

    shocks students. *Toronto Star, p. D01.*

Hill, L. (2001, June 15). Pedagogical and androgogical learning. *AuthorsDen.* Retrieved

    April 11, 2007 from

    http://www.authorsden.com/visit/viewarticle.asp?AuthorID=3256&id=1416

Hinds, I. (1999). Special needs of adult learners in science (biology). *Community Review,*

    17, 42. Retrieved April 07, 2007 from the Academic Search Elite database.

Klinger, B. (2004). The laptop initiative in the graphic communications management

    program at the University of Wisconsin-Stout: A comparison of initial student

    expectations versus actual usage for the fall 2002 semester, Unpublished Master's

    Thesis, University of Wisconsin – Stout, Menomonie

Knowles, M. S., Holton, E. F., & Swanson, R. A. (1998). *The adult learner.* Houston,

    TX: Butterworth-Heinemann, Publishers.

McVay, G., Snyder, K., & Graetz, K. (2005). Evolution of a laptop university: A case

    study. *British Journal of Educational Technology, 36*(3), 513-524.

Penuel, W. (2006). Implementation and effects of one-to-one computing initiatives: A

    research synthesis. *Journal of Research on Technology in Education, 38*(3), 329-

    348.

Schuetze, H., & Slowey, M. (2002). Participation and exclusion: A comparative analysis

    of non-traditional students and lifelong learners in higher education. *Higher*

Education, 44(3/4), 309-327. Retrieved April 11, 2007 from the Academic Search

Elite database.

Trotter, A. (2000). Effectiveness of computers still open to question. *Education Week,*

20(3), 13. Retrieved Saturday, April 14, 2007 from the Academic Search Elite

database.

University of Minnesota-Crookston. (2006a). *Computer help desk: Hardware.* Retrieved

June 24, 2006 from http://www.crk.umn.edu/technology/laptopu/index.htm

University of Minnesota-Crookston. (2006b). *UMC history.* Retrieved June 24, 2006,

from http://www.umcrookston.edu/info/UMCHistory/index.htm

Wake Forest University. (2005, April). *Information systems.* Retrieved June 29, 2006

from http://www.wfu.edu/technology/about/plan.html

Weiser, M., Gold, R. & Brown, J.S. (1999). The Origins of ubiquitous computing

research at PARC in the late 1980s. *IBM Systems Journal, 38*(4), 693-695.

Wikipedia. (2006). *Visual communications.* Retrieved June 30, 2006 from

Zucker, A. (2004). Developing a research agenda for ubiquitous computing in schools.

Journal of Educational Computing Research, 30(4), 371-386.

Appendix A: *Laptop purchase flyer sample WCTC*

WCTC BOOKSTORE APPLE LAPTOP SOLUTIONS
WCTC Bookstore is located in building K.   Phone: 262.691.5304   Contact: Rick Miller

MacBook Pro Laptop
2.0GHz SuperDrive
1 GB DDR2 SO-DIMMs
100GB Serial ATA drive @ 5400 rpm
SuperDrive (DVD±RW/CD-RW)
AirPort Extreme Card & Bluetooth
Backlit Keyboard/Mac OS - U.S. English
15.4" Widescreen Display
    Other Apple Components include:
Apple Mighty Mouse
AppleCare Protection Plan for PowerBook

$2,200.00

Upgradeable Parts:

A $232 savings from website!

Jansport Laptop Bag
SmartDisk 40GB Mobile Firewire Drive

Available Upgrades

Also Available

External Hard Drives Options

SmartDisk 60GB Firewire	add	$ 20
SmartDisk 80GB Firewire	add	$ 40
Apple 30GB Video iPod	add	$150
Apple 60GB Video iPod	add	$250

Add the amount to the total above as this option
replaces the 40GB Firewire Drive

Optional iPod Accessories

Earbuds $16.99, Car/Cup Holder
$19.99, Boom Box $89.99, Auto
Charger $19.99, ToughSkin $33.99,
Voice Recorder $39.99, FM
Transmitter $34.99.

Laptop Bags Options

Jansport Power Supply	same price
Jansport Circuitry	same price

Canyon Leather Bags

Computer Backpack	add	$10
Slim Line Laptop Case	less	$10
Wheeled Computer Backpack	add	$30

Required Software

**Students can purchase Adobe
Creative Suite 2 on-line for $199
@ www•wisc•edu/wisc   or**

The Bookstore's academic prices are:

Adobe Creative Suite 2	$399
Adobe Creative Suite 2 Upgrade	$349

Laptop Interest Survey

Originator's Name: Mark Davini

Title: Visual Communications (Vis-Com) Instructor

Questions regarding laptop initiative

Accessibility	Strongly agree	Agree	Disagree	Strongly Disagree	Demographics	
There is ample accessibility to computers to do my assignments	☐	☐	☐	☐	Male	☐
I would use Graphics/Vis-Com software more if it were always available to me	☐	☐	☐	☐	Female	☐
A laptop would be a useful tool in the field once I'm done with school	☐	☐	☐	☐	Age:	
A laptop at my disposal would improve the quality of my education	☐	☐	☐	☐	17 - 20	☐
I would attend this program if it was mandatory that I get a laptop	☐	☐	☐	☐	21 - 25	☐
Computer platform					26 - 30	☐
I would attend if the computer ran Windows	☐	☐	☐	☐	31 - 35	☐
I would attend if the computer ran Mac OS	☐	☐	☐	☐	35 - over	☐
This issue does not matter to me	☐	☐	☐	☐	Yearly Income:	
Support					Below $15,000	☐
I would attend if financial aid were available for laptop purchase	☐	☐	☐	☐	$16,000 - $20,000	☐
I will buy the laptop the program recommends	☐	☐	☐	☐	$21,000 - $25,000	☐
I would attend if on-campus technical support were available	☐	☐	☐	☐	$26,000 - $30,000	☐
I will need additional training in order to use my laptop	☐	☐	☐	☐	$31,000 - $34,000	☐
I would not attend if there were no technical support	☐	☐	☐	☐	$35,000 - over	☐

Appendix B: *Survey instrument given to students for use in this study*

38

Appendix C: *Sibenaller quote from ROSCOR*

ROSCOR

Date:	February 28, 2008
Page:	1 of 4

To

Mark Davini
Western Technical College
304 6th Street N
La Crosse WI 54601
Phone: (608) 785-9584   Fax: (608) 785-9407

Quote:	TS63-1371
Sales Rep:	Tom Sibenaller
Payment Terms:	Standard Project Terms
Freight Terms:	Prepay & Add
Valid For:	30 Days

Item	P/N	Description	Qty.	Unit Price	Ext. Price
Section 1: HD Production Switcher					
1.1	**Broadcast Pix 1000H** Slate 1000 HD Production Switcher		1	$ 19,884.00	$ 19,884.00
1.2	**Broadcast Pix 49** Additional 4 HD/SD-SDI Inputs		1	$ 4,509.00	$ 4,509.00
1.3	**Broadcast Pix 320** MPEG2 Support for Clip Store		1	$ 369.00	$ 369.00
1.4	**LG / Zenith L206WTY-BF** 20 inch Widescreen Active Matrix LCD Monitor 1680 x 1050, 3000:1, 300cd/m2, 2ms		1	$ 241.00	$ 241.00
1.5	**LG / Zenith M3201C-BA** 32 inch 16:9, HDTV monitor 1366 x 768p, 1600:1 contrast ratio, 500 cd/m2 brightness, 176 viewing angle, adv. PIP, temperature sensor, lamp fault sensor, split zoom (self video wall), hi-res component, HDMI, D-sub 15-pin, S-video, A/V, RS-232C, discrete IR codes, backlit logo		1	$ 804.00	$ 804.00
1.6	**Broadcast Pix 601** First Day, On-Site Training/Commissioning Travel Expenses included.		1	$ 1,956.00	$ 1,956.00
		HD Production Switcher Section Total:			**$ 27,763.00**
Section 2: Studio Cameras					
2.1	**JVC GYHD250STL16** GY-HD250 Studio Package w/16X Fujinon Lens Includes GY-HD250 Camcorder, Fujinon TH16x5.5BRM Zoom Lens, KA-HD250 Camera Studio Adaptor, VF-HP840U LCD Studio Viewfinder, RM-HP250U Camera Control Unit, and Rear Lens Controls		3	$ 20,427.00	$ 61,281.00
2.2	**JVC VC-P113U** 26 pin Multicore Cable, 50M		3	$ 1,634.00	$ 4,902.00

Item	P/N	Description	Qty.	Unit Price	Ext. Price
2.3	Mirror Image LC-110 10.4" Color LCD Teleprompter		3	$ 3,192.00	$ 9,576.00

			Studio Cameras Section Total:	$ 75,759.00

Section 3: Source Devices

Item	P/N	Description	Qty.	Unit Price	Ext. Price
3.1	Pioneer DVD-V5000 Professional DVD Player		2	$ 374.00	$ 748.00
3.2	FEC RKIO-5000 CUSTOM RACKMOUNT		2	$ 116.00	$ 232.00
3.3	AJA Desktop IOHD Portable 10-bit realtime HD/SD editing via FireWire 800		1	$ 2,814.00	$ 2,814.00

			Source Devices Section Total:	$ 3,794.00

Section 4: Infrastructure

Item	P/N	Description	Qty.	Unit Price	Ext. Price
4.1	Leitch (si) ADV6800+D 6800+ Component Analog to Digital Converter		2	$ 1,349.00	$ 2,698.00
4.2	Leitch (si) XHD6800+U1D 6800+ Utility Upconverter		2	$ 2,616.00	$ 5,232.00
4.3	Leitch (si) FR6802+QXF+E Frame, 2RU, Ethernet, fan, one PS, QSEE		1	$ 1,380.00	$ 1,380.00
4.4	Leitch (si) X75HD Up/Down/Cross Conv&Sync, Video Only, Local Control		1	$ 10,013.00	$ 10,013.00
4.5	Leitch (si) X75OPT-HDDUOCON Optional Software Key for Up/Dn or Cross/Dn, X75HD		1	$ 2,312.00	$ 2,312.00
4.6	Evertz 7701FR 1RU Multiframe which holds up to 3 single or dual slot modules		1	$ 992.00	$ 992.00
4.7	Evertz 7751SRG-HD+1RU HD Tri-level Slave Sync Generator		1	$ 2,152.00	$ 2,152.00
4.8	Evertz 7751TG2-HD+1RU Dual HD Test Signal Generator with embedded audio		1	$ 3,451.00	$ 3,451.00
4.9	Winsted E4727 Single Rack Edit Console		1	$ 1,158.00	$ 1,158.00
4.10	Winsted E4781 Two Bay Work Station		1	$ 1,745.00	$ 1,745.00
4.11	Marshall V-R43P Triple 4 inch LCD Screen Rack Mount Panel		2	$ 1,007.00	$ 2,014.00

			Page: 3 of 4		
			Quote: TS63-1371		
			Date: February 28, 2008		
Item	P/N	Description	Qty.	Unit Price	Ext. Price

		Infrastructure Section Total:	$ 33,147.00

Section 5: Installation/Integration

| 5.1 | Roscor SYSTEMINTEGRATION | 1 | $ 14,937.00 | $ 14,937.00 |
| | Roscor System Integration | | | |

	Installation/Integration Section Total:	$ 14,937.00

All prices quoted in U.S. Dollars   **Total: $ 155,400.00**

All Sales are subject to our Standard Terms & Conditions.

Quote Total: $ 155,400.00