ASSESSMENT OF ALTERNATIVE DELIVERY SYSTEMS WITHIN ELECTRONICS PROGRAMS IN THE WISCONSIN TECHNICAL COLLEGE SYSTEM

by

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ABSTRACT

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Are educational institutions keeping pace in the information--now digital age? The purpose of this study was to determine the extent of alternative delivery in Electronics programs within the Wisconsin Technical College System (WTCS), document the techniques utilized, and revisit a 1993 study where 27% of Associate Degree Electronics programs used Computer Assisted Instruction (CAI) as an alternative delivery technique. A questionnaire administered to 40% of 120 WTCS Electronic instructors indicated 61% of respondents fell within a range of 5-20% CAI within their programs. Ninety percent are currently using some form of alternative delivery with the top two “Self-paced” (37%) and “Computer” (39%) followed by “Instructional Television” (17%) and “Web” (6%), indicating a need for further study to examine the low web-based delivery utilization.

Acknowledgments

Without the guidance and support of the field study chair Dr. Ed Biggerstaff, this field study would not be possible–you have my sincere gratitude. I would also like to acknowledge the rest of the field study committee for their commitment and participation with this study; Dr. Peters thank you for your time and effort and Dr. Zimmerman I am extremely grateful for your feedback and willingness to serve on the committee at the last minute.

To my family, thank you for your patience and understanding. And I am deeply grateful to my wife who has been pregnant twice during this study.

And finally, I would like to acknowledge my fellow Wisconsin Technical College faculty for your time and effort completing the questionnaire. It is my greatest hope that you will find this study useful.

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Chapter One

Introduction

Much of what was alternative delivery a decade ago is now considered a valid primary delivery mode. An example would be the use of computers for instruction, Computer Assisted Instruction (CAI, or other terms such as Computer Based Training, Computer Based Instruction) are often used as a primary mode of instruction today. A secondary purpose of this study was to revisit a 1993 study "The State of Computer-Assisted Instruction within Electronic Programs in the Wisconsin Technical College System" to gauge the presumed increase in the use of technology in the classroom. In 1993 only 10 of 37 Associate Degree electronic related programs (27%) used CAI (Van De Hey, 1993).

One rational for the low CAI usage was the lack of a common core for electronic-based programs. The Wisconsin Technical College System (WTCS) now has a common core emerging in electronics-based programs which provide a larger audience for disseminating information, collecting statistics, allocating funds, and coordinating curriculum efforts and projects like alternative delivery.

The WTCS has launched a "Virtual Campus" in the fall of 2000, which is the focal point on the Internet for web-based courses. With standards in place instructors and curriculum developers have submitted proposed courses to be reviewed by the Virtual Campus board for possible selection. The originating institution will receive the tuition for students enrolled through the Internet.

Statement of the Problem

With society well into the information age, the question arises as to whether education is keeping pace. Technology has provided access to the overwhelming quantity of digital information available to students today. Will new tools change the role of instructors, of educational institutions? To ignore the changes that have occurred, such as the rise of the Internet and continued digitization of information would truly limit educational opportunities available at traditional educational institutions. “Distance learning technology may not make the traditional campus obsolete, but an institution without an appropriate plan of action could get left behind” (Earls, 1999, p.30).

Purpose of the Study

The purpose of this study was to determine the extent of alternative delivery within Electronics programs within the Wisconsin Technical College System (WTCS), to document the delivery techniques utilized, and to quantify and contrast the amount of change in Computer Assisted Instruction (CAI) through a follow up of a 1993 study.

Assumption

For the purpose of this study, it will be assumed that each instructor utilizing alternative delivery has made ongoing evaluations of its effectiveness and can therefore accurately evaluate its impact.

Limitation of the Study

This study will be limited to electronics-based program instructors within the Wisconsin Technical College System (WTCS). Electronic-based programs are those associate degree programs with a common core of electronics courses in the first year.

Chapter Two

Review of Literature

This chapter includes a review of literature encompassing current alternative delivery systems. The paradigm of the new digital age school house and the expanding role of the instructor are presented. Learning objects are introduced as an educational tool for knowledge management, producing a web-based knowledge database. And finally, a software platform is introduced to coordinate many of the educational tools available in the digital age.

The digital age and education.

Is education keeping pace in the information age, or more aptly the digital age? Educators, today, are required to have a greater technological proficiency than ever before. We understand that to address multiple learning styles, multiple delivery and assessment strategies are often required. While advances in technology are often intimidating, society is relying on us in a large part to close the digital divide. “The problem is that the educational paradigm of the Industrial Age is no longer a valid learning model in the Digital Age (see Resnick and Klopfer)” (Leonard, 1999, p.9). Some have gone as far as to say that with the trend toward digitization of knowledge and expansion of technical communication, education needs to move from the factory model (industrial age) to a web-based distance educational model (digital age). (Leonard, 1999)

The digital age schoolhouse will focus expenditures on using technology as integral to the process of learning. Educators must be provided with the right tools, infrastructure, and rewards, not to mention time, to promote the new digital schoolhouse paradigm. It is not enough to integrate technology into the traditional learning environment. Technology would be best utilized in a learner centric environment where the focus is the importance of the learner over the instructor.

> The instructor must be a catalyst, a coach, and a program manager directing projects. Otherwise, we are revisiting the Industrial Age education model in which the student is the bench-bound listener passively absorbing content, the body of which is available only via the primary knowledge gatekeeper, the instructor (see Schneider). (Leonard, 1999, p.13)

Learning objects.

In industry technical communication is transforming a product focus from physical assets to knowledge assets and introducing knowledge management. As educators (knowledge managers) our roles should be more focused on the evolution of knowledge objects from analog to digital that is from a linear paper representation to a web-based Knowledge database. (see Appendix A for an Electronics Theory Learning Object)

Fox Valley Technical College has just completed (September 1, 1999-August 2001) a $1.6 million dollar project to accelerate the development of quality online courses while, at the same time, minimize the cost of course development by identifying and sharing best practices. "Faculty from throughout the Wisconsin Technical College System create "learning objects" (activities, text, animation, graphics…) for each competency within the General Education courses of Communication Skills, Social Studies, Math, Science, and Adult Basic Education". (Fund for the Improvement of Post-secondary Education (FIPSE) Fact Sheet, http://www.wisc-online.com/about/FIPSE%20Fact%20Sheet.htm, 7/8/2002)

A second project, totaling $1.1 million, has just begun (July 1, 2001-June, 2004) to develop a Core Manufacturing Digital Library to access and advance the teaching and learning of common manufacturing concepts in technician education using the power of online multimedia resources. "Web-based resources are designed, built and linked to competency-driven/topic related curriculum. The digital library is developed with the collaboration of content-expert faculty designing learning objects and instructional technology specialists providing the implementation" (National Science Foundation (NSF) Grant Fact Sheet, http://www.wisc-online.com/about/NSF%20Wisc-Online%20Fact%20Sheet.htm, 7/8/2002). For the Wisconsin Online Resource Center's definition for Learning Objects see figure 1. For the Wisconsin Online Resource Center's Quality Standards for learning objects see figure 2.

Figure 1

What Are Learning Objects?

Learning Objects are:

- A new way of thinking about learning content—traditionally, content comes in a several-hour chunk called a course. Learning objects are much smaller units of learning, ranging, for example from 2 to 15 minutes.
- Small, independent chunks of knowledge or interactions stored in a database--can be presented as units of instruction or information.
- Based on clear instructional strategy—intended to cause learning through internal processing and/or action.
- Self-contained—each learning object can be taken independently.
- Interactive—each learning object requires that students view, listen, respond or interact with the content in some way.
- Reusable—a single learning object may be used in multiple contexts for multiple purposes.
- Able to be aggregated—learning objects can be grouped into larger collections of content, including traditional course structures.
- Tagged with metadata—every learning object has descriptive information allowing it to be easily found by a search.
- Built to meet the Wisconsin Online Resource Center Quality Standards.
- Learning objects let you have learning that is:
    - Just enough—if you need only part of a course, you can use the learning objects you need.

- Just in time—learning objects are searchable, you can instantly find and take the content you need.
- Just for you—learning objects allow for easy customization of courses for a whole organization or even for each individual. (What Are Learning Objects?, http://www.wisc-online.com/Info/FIPSE%20-%20What%20is%20a%20Learning%20Object.htm, 7/8/2002)

Figure 2

Quality Standards--The Wisconsin Online Resource Center's

Quality Standards for learning objects:

- Shows a clear purpose, i.e., is immediately relevant to the learner.
- Reflects a specified learning preference (visual, auditory or kinesthetic).
- Supports the competency at the appropriate level (Bloom).
- Helps learners understand the concept being presented.
- Is able to be applied to courses in different subject areas.
- Is able to be applied to different programs of study.
- Can be grouped into larger collections of content, including traditional course structures.
- Requires interaction on the part of the learner with the learning materials, i.e., responding and acting to apply higher-order thinking skills.
- Can stand alone, i.e., is not dependent on external sources (textbook chapters, videos)
- Contains all information and materials needed by learners to complete the activity, e.g., introduction, conclusion, learning content
- Is easy to use for the learner.
- Applies appropriate Principles of Good Practice (AAHE).

- Applies appropriate Learning College Principles (O'Banion). (Wisconsin Online Resource Center Interactive Learning Objects--Quality Standards, http://www.wisc-online.com/builders/QStandards Interactive LOs.htm, 7/8/002)

Fox Valley Technical College has recently adopted Blackboard as an online course platform. Blackboards vision is to transform the Internet into a powerful environment for teaching and learning. (Blackboard Inc. Corporate Fact Sheet, http://www.blackboard.com, 7/16/02) The Blackboard Learning System platform promotes web-based learning activities:

- Ask questions via email
- Participate in discussion questions
- Participate in virtual discussions (like chat or instant messenger)
- Turn in assignments
- Take tests online

The vision of a universal campus network is upon us. Education need not be restricted to place or time. "If we in education do not satisfy the needs of industry, industry will set up its' own virtual campus and replace us (see Schank)" (Leonard, 1999, p.16). (For example Microsoft/Novel certification) "California has one third of its accredited universities (100) participating in the California Virtual University (CVU)" (Leonard, 1999, p.16). CVU provides students access to the best virtual learning material while itself not granting any degrees and in Wisconsin the WTCS has a virtual Campus providing a focal point for Web-based learning at the technical college level.

Web-based assessment.

As crucial as instructional delivery is to the learning process, the process is not open ended. Assessment is required to close the loop and provide a method for continuous improvement in both student and course outcomes. Internet or Web-based testing can provide obvious advantages over traditional paper and pencil tests. Advantages of web-based testing include immediate results, immediate analysis, and reduced costs.

To test these advantages and explore concerns; such as performance & attitudes, privacy/security, disadvantaged, operational expenditures, a pilot project was conducted statewide in Pennsylvania. Tests consisted of multiple choice items selected from item banks developed by the Vocational Technical Education Consortium of States (VTECS). Multiple-choice items were selected through a point and click process. Participant logged onto the web site using passwords. The system then generated the test instrument and immediately scored the test when the student clicked on a button displayed on the screen. Students were requested to print out their test results for review by their instructor.

Software used was configured to run on older 486 computers with limited resources to operate on the largest number of available computers.

Internet access was best through a networked classroom and server with Internet access provided by a non-governmental organization, (which are lagging behind the exponential growth of the Internet).

Project results indicate that web-based testing and paper-and-pencil testing are equivalent, and Internet delivery introduced no bias relative to gender or special education needs. Students preferred Internet delivery by a 3-to-1 margin. While the majority of participants were relatively inexperienced with the Internet, they did not have significant problems accessing the Internet. Test administrators reported less preparation, effort, and class time and substantially less effort for data analysis. Overall Project results indicate the Internet offers a viable and cost-effective alternative to paper-and-pencil testing. The lack of test bias also indicates that school systems can transition to Internet delivery while using both types of administration. (Bicanich, Slivinski, 1997)

An Internet-based course example.

An Internet-based introductory college astronomy course can provide an effective model of design criteria for new Internet-based courses. One of the disadvantages of any distance-learning course, as noted by the author, Ladevaia, is that you find yourself devoting more time per student than you do in a standard lecture. You become a private tutor to your students. An advantage is that once set up, the course can be taught from anywhere on earth.

One course design criteria is a “lecture” component. To accomplish this on the Internet interactivity and a visual sense would have to be incorporated into the course. The author/professor accomplished this via a live video stream to the student’s web browser.

An inexpensive program will connect up to four users and provide for communication via a chat mode. This video link is also used for real-time online telescopic observations from several cameras located throughout an observatory. Yet, another use of the video link is a frame-by-frame update whenever the student is on the appropriate web page. This allows the professor to show the student the actual object they are chatting about.

With the Internet being a storehouse of current, factual material on almost every subject, the Internet can reduce the required text by providing students appropriate “links” to material on the web. The student always has information from the source, which is accurate and up to date.

Another challenge was to provide the student with a sense of the instructor’s personality. This was accomplished through an “electronic text book” for the course in which the author/professor included a short biography, an introduction of the professor to his students.

This CD-ROM includes the course textbook, graphics, and an audio video introduction of the professor.

The course laboratory activities are accomplished through the frame-by-frame update mode on the video link. The student to receive a high-resolution image via e-mail can use a CCD imager on the telescope.

To conduct the course a reliable Internet connection is required. A suitable web site will provide an entry point for the course. And an institution will take care of registration of students for college credit. The cost of development was estimated at $60,000 and two years of work, while the student cost was less than a standard textbook. (Ladevaia, D. 1999)

Technopoly.

Have we begun to deify technology, and are we thinking critically about the place of computer technology in the curriculum? “The prevailing rhetoric about technology in education reveals the presence of Technopoly, a state of mind that “consists in the deification of technology, which means that the culture seeks its authorization in technology, finds its satisfaction in technology, and takes its orders from technology” (Postman, 1992, p.71). Technology is never a neutral force; it orders our behavior, redefines our values, and reconstitutes our lives in ways we can’t predict…

says Slouka in War of the Worlds. Much of the dialog today lacks discussion of cost, questions of purpose, and philosophical debate.

There are negative examples that coexist with the positive. “Even with shrinking resources and teacher layoffs, many parents, administrators, and professors cry out for more and better hardware and software” (Schwarz, 1996, p.77). North Carolina spent seven million dollars to connect sixteen high schools to teach Japanese through interactive video to a small number of students. A teaching assistant in Oklahoma was advised to change her grading system to conform to a software package.

The use of computer technology can reduce learning to trivial pursuits; information does not equal meaning making or problem solving. All of us want students to experience warmth, human interaction, the thrill of discovery, and solid grounding in the essentials. It can be argued that only a teacher, live in a classroom, can bring this about. (Schwarz, 1996)

Critical issues in society often polarize groups to the extreme. Even the exponential growth of technology leaves all but a few with the knowledge to use it, while others fear what they do not understand—or control.

Perhaps it is because few feel confident about their understanding of technology that so few questions have been raised about the negative impacts of technology on learning. Thoreau warned we might become the "tools of our tools." I believe the questions need to be asked, and it is not whether to use technology or not, but more appropriately how and when, and most importantly in what proportion. Technology is but one tool as is the intellect; we must learn to cultivate use of both.

A new frontier.

While the link between technology and intellect must be forged, many have permanently linked web-based instruction to distance education. Distance education conjures up a single-minded vision of instructional delivery. But is this vision strong enough to replace the group interactions of the traditional classroom: building morals and team concepts to name a few?

The World Wide Web and other new technologies are on the verge of imposing a new order on the way we learn. While some have braved the new frontier with tentative forays or complete paradigm shifts, others are eagerly analyzing their effectiveness. Some results indicate that no real difference between traditional face-to-face learning and distance learning has shown up in most anecdotal reviews. "Former Connecticut Commissioner of Higher Education said, students at Rensselaer Polytechnic Institute science course, which uses a CD-ROM and encourages students to study in small teams, actually performed better than those taught the traditional way" (Earls, 1999, p.30).

> Research by Sunnyvale, Calif., technology consultant Brandon Hall shows that commercial technology-based training speeds up the learning process from 20 percent to 80 percent, freeing learners to put their knowledge into practice sooner, and may cost as much as 50 percent less than traditional, instructor-led training, pleasing the corporations that foot the bill and undoubtedly threatening providers of traditional education and training programs. (Earls, 1999, p.30)

Whether institutions survive and prosper may depend upon how quickly and effectively they adapt. "Distance learning technology may not make the traditional campus obsolete, but an institution without an appropriate plan of action could get left behind" (Earls, 1999, p.30).

Examples of the new frontier in distance education include:

- University of Phoenix, a private-for profit institution (and hot item on Wall Street) enrolls more than 61,000 students–making it America's largest private accredited university. Some students receive all their instruction from this 20-year-old institution via the Internet. U-Phoenix has also established itself as a purveyor of professional certification for the computer industry.

- The Western Governor's Association (WGA-Governors of 18 western states) formed a virtual Western Governor's University in 1998, which began offering three degree and certificate programs.
- MIT and Britain's Cambridge University began transmitting certain required courses through distance learning. This has enabled up to fifty undergraduates to spend their junior year at the other campus.

Accreditation is a sticking point for distance learning, while quality and effectiveness are in question. The American Association of University Professors, criticizing web-based Jones International University, has stated that "The development of distance education technologies has created conditions seldom, if ever, seen in academic life–conditions which raise basic questions about standards for teaching and scholarship" (Earls, 1999, p.30). But the major U.S. accrediting organizations have already begun to update their quality standards to accommodate electronic learning systems.

Tuition for distance learning programs has not been much lower than traditional programs however the potential for cost savings exists. "According to International Data Group (IDG), of Framingham, Mass., Colleges are expected to spend nearly $5 billion on information technology by 2003, up from 3.1 Billion in 1998" (Earls, 1999, p.31). Clearly many universities are now implementing plans to increase their electronic learning systems.

In summary, a glimpse of education in a learner centric digital schoolhouse would have faculty assuming new roles and mastering new technology. Students will discover a greater wealth of knowledge, made more accessible through technology and the use of learning objects in a structured knowledge database. The majority of assessment would be accomplished online, providing real-time feedback for students and freeing faculty to continue developing test banks and other web-based tools. While there is a growing list of successful web-based colleges, others have married the strengths of the traditional classroom with the new cyber-tools of the digital age. Regardless of the level of web-based integration, continuous assessment of all aspects of the students learning experience is essential for continued success.

Chapter Three

Methodology

In this chapter the participating faculty and their programs are described as well as the questionnaire document they submitted for this study. Methods utilized are also listed to explain the procedures used to gather and analyze the data.

Participants.

The sample for this study consists of electronics programs in the Wisconsin Technical College System (WTCS), which are identified in this study as Associate Degree electronics-based programs and contain similar first-year electronics content, providing the largest homogenous group. Programs included in the study are as follows: Electronics (13 programs), Electronic Design Technician (1), Electronics-Computer (5), Electronics Telecommunications (2), Electronics Systems Technician (1), Electro-mechanical Technology (11), Bio-Medical Electronics (2), and Instrumentation (2). This group provides a base of 37 programs with 121 instructors. Technical Colleges are in operation throughout the state in sixteen local districts, including: Blackhawk (Janesville), Chippewa Valley (Eau Claire), Fox Valley (Appleton), Gateway (Kenosha), Lakeshore (Cleveland), Madison Area, Moraine Park (Fond u Lac), Nicolet Area (Rhinelander), Northcentral (Wausau), Northeast Wisconsin (Green Bay), Southwest Wisconsin (Fennimore), Waukesha County Area (Pewaukee), Western Wisconsin (La Crosse), and Wisconsin Indianhead (Shell Lake).

Sampling techniques.

Two methods were utilized to administer the questionnaire; first, the questionnaire was used in a phone survey soliciting 21 responses, and secondly, through personal distribution at a state called meeting for electronics-related programs at Fox Valley Technical College. This yielded an additional (non-duplicated) 27 responses for a total sample of 48 instructors or 40% of the 121 instructors statewide.

Instrument.

The survey instrument consists of a single page questionnaire designed to identify the alternative delivery type and usage within an identified electronics-based program and contrast the overall percentage of computer assisted instruction (CAI) with that of a 1993 study (Van De Hey, 1993) with a similar sample group (see Appendix B). A cover letter accompanied the questionnaire, which introduced the field study topic. The letter also described that this questionnaire was strictly voluntary, and by completing the questionnaire they are providing their informed consent. Also included in the letter were addresses and phone numbers of the researcher, research advisor and chair of the Institutional Review Board for the Protection of Human Subjects.

Analysis procedure.

The initial phase of the field study was to conduct a literature review to aid in the design of the study and assure the need for the study. Phase two was to develop a questionnaire to determine the extent of alternative delivery in electronics programs within the Wisconsin Technical College System (WTCS) and document the techniques in use. The third phase was to attempt to contact all electronics-related program instructors in the WTCS to conduct a phone/personal interview using the developed questionnaire. The final phase of the field study analyzed the data gathered from both the literature review and questionnaire to determine the extent of and techniques used for alternative delivery in electronics-based programs.

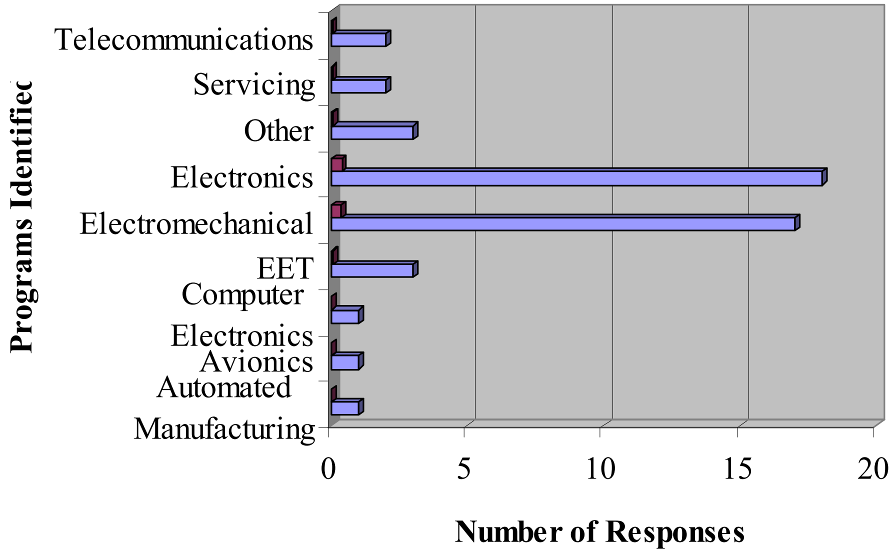
Chapter Four

Results

This chapter presents the results of the data gathered from the field study questionnaire (see Appendix B). Seven questions were utilized to ascertain and identify the extent of, and techniques used in, alternative delivery within electronic-based programs in the WTCS.

Question one was designed to identify the program area of the respondent. Two program areas encompassed 73% of the total responses; Electronics with 38% and Electromechanical Technology with 35%. Three respondents checked other and did not identify a specific program. Four surveys indicated more than one program and were treated as separate surveys for the first question. One questionnaire indicated a non-associate degree program (apprentice) and was not included in the study. (See Figure 3)

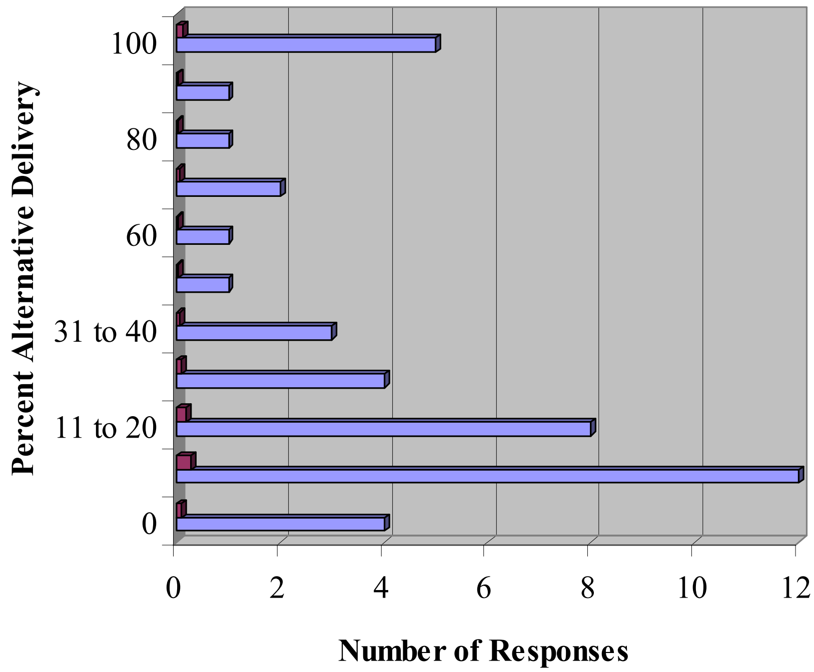
Figure 3



	Auto mate	Avio nics	Com puter	EET	Elect rome	Elect ronic	Othe r	Serv icing	Tele com
Percent of Responses	2%	2%	2%	7%	37%	39%	7%	4%	4%
Program	1	1	1	3	17	18	3	2	2

Question two was designed to elicit the overall percentage of alternative delivery within the previously identified program. Ninety percent of those surveyed were using some form of alternative delivery. The most common percent of alternative delivery within a program was in the 1-20% range, with 48% of respondents choosing this range. Twenty six percent of respondents listed a percent greater than the listed scale of 40%, while 12% listed 100% of their programs where alternative delivery and 10% listed no alternative delivery. (See Figure 4)

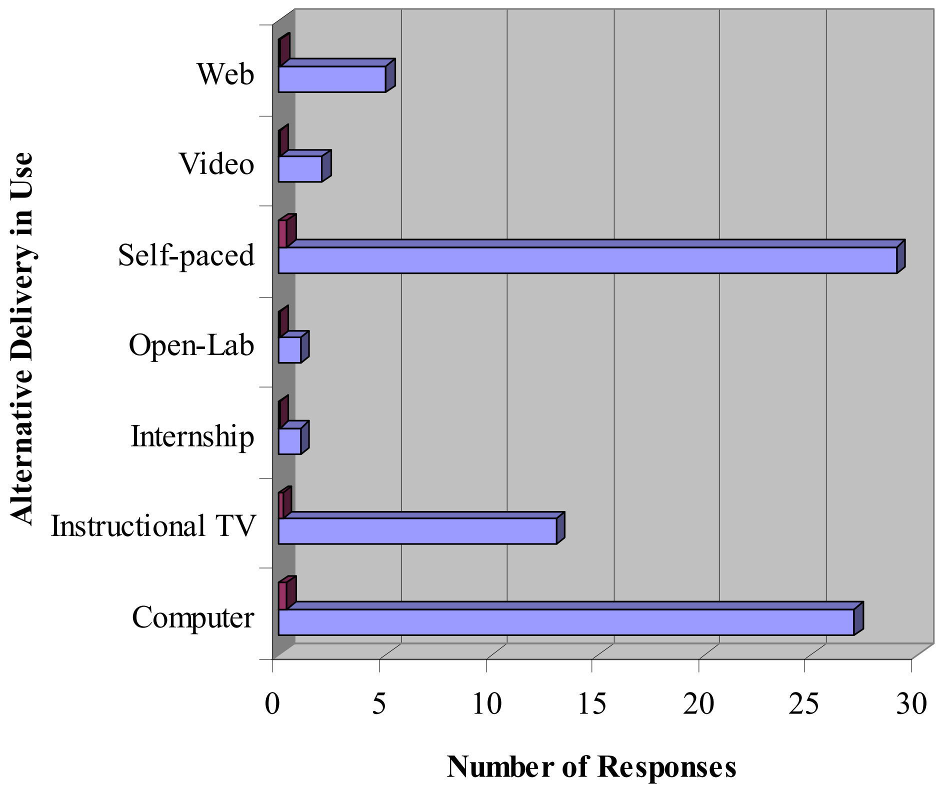
Figure 4



	0	1 to 10	11 to	21 to	31 to	50	60	65	80	85	100
Percent of Responses	10%	29%	19%	10%	7%	2%	2%	5%	2%	2%	12%
Responses	4	12	8	4	3	1	1	2	1	1	5

Question three was designed to identify all alternative delivery in use. Of the alternative delivery styles in use “Self-paced” and “Computer” were the top two with 37% and 35% respectively. “Instructional Television (ITV)” was next with 17% followed by “Web (Internet)” with 6%. (See Figure 5)

Figure 5

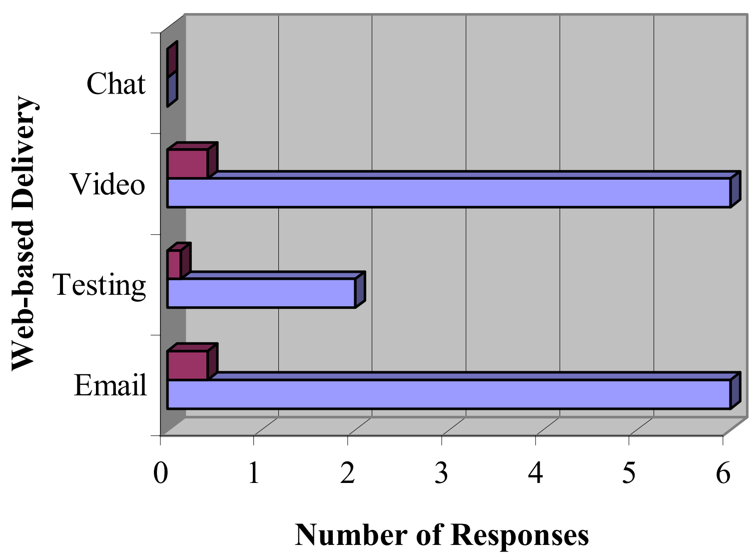


	Computer	Instructional	Internship	Open-Lab	Self-paced	Video	Web
Percent of Responses	35%	17%	1%	1%	37%	3%	6%
Responses	27	13	1	1	29	2	5

Question four was designed to identify the web-based components in use. While only five responses from question three identified "Web" as an alternative delivery, eleven responded to the "if web-based delivery" question four.

Within the subsection of web-based components, 40% use email, 40% use video, 14% testing, and no one is using Internet chat as a web-based course feature. Twenty seven percent of web-based delivery utilized specified a minimum computer requirement of web-access. Two respondents identified web authoring software: Macromedia and Front Page. (See Figure 6)

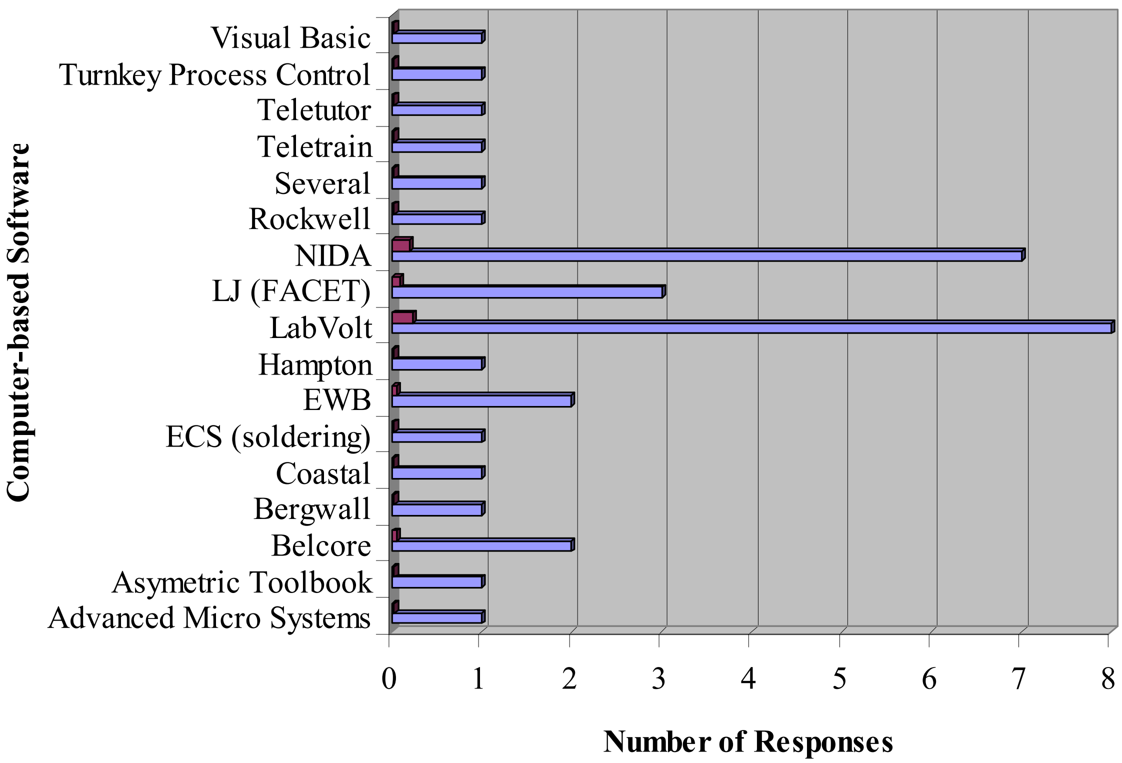
Figure 6



	Email	Testing	Video	Chat
Percent of Responses	43%	14%	43%	0%
Responses	6	2	6	0

Question five was designed to identify computer-based delivery software. Sixteen different computer-based software packages were identified. Of the packages identified LabVolt and NIDA had the highest response with 24% and 21% respectively. (See Figure 7)

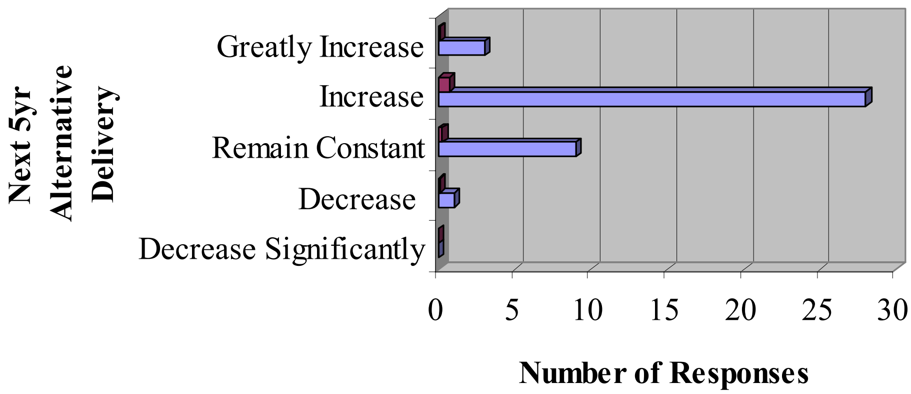
Figure 7



	Ad va	As ym	Be lc	Be rg	Co ast	E CS	E W	Ha mp	La bV	LJ (F	NI D	Ro ck	Se ve	Te let	Te let	Tu rn	Vi su
Percent of Responses	3%	3%	6%	3%	3%	3%	6%	3%	24	9%	21	3%	3%	3%	3%	3%	3%
Responses	1	1	2	1	1	1	2	1	8	3	7	1	1	1	1	1	1

Question six was designed to elicit future expectations of alternative delivery over the next five years. When asked to project the extent of alternative delivery into the next five years, 68% chose “Increase”, 22% “Remain Constant”, 7% “Greatly Increase”, 2% “Decrease”, and no one chose “Decrease Significantly”. (See Figure 8)

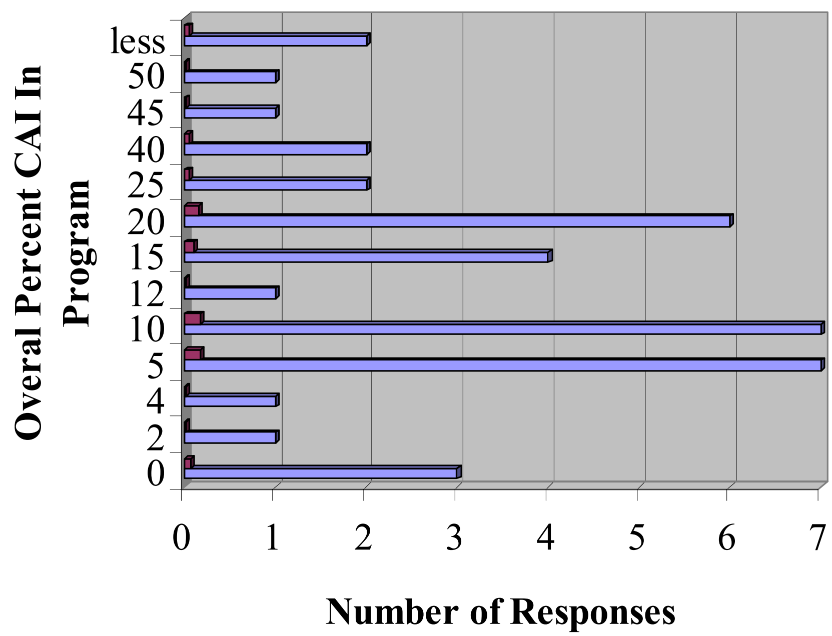
Figure 8



	Decrease	Decrease	Remain	Increase	Greatly
Percent of Responses	0%	2%	22%	68%	7%
Responses	0	1	9	28	3

Question seven of the questionnaire asked the respondent to list the overall percent of Computer Assisted Instruction (CAI), a form of alternative delivery, to compare results with a previous study researching CAI in 1993 with the same faculty group. The overall percent of CAI within a program averaged 13% while in 1993 the average was 20% (Van De Hey 1993). Sixty one percent of respondents fell within a range of 5-20% CAI. (See Figure 9)

Figure 9



	0	2	4	5	10	12	15	20	25	40	45	50	les s
Percent of Responses	8%	3%	3%	18	18	3%	11	16	5%	5%	3%	3%	5%
Respones	3	1	1	7	7	1	4	6	2	2	1	1	2

Chapter 5

Summary, Conclusions, and Recommendations

Summary

With technological development increasing at an exponential rate, many corporations, institutions, and individuals have been struggling to keep pace. There are many innovative individuals in education who have been testing the new technological frontier and many have adopted what will soon be commonplace practices in education. Web-based delivery of some program courses or course components has become common practice at many institutions. The pressure to keep pace with technology has had some institutions rushing to implement vast changes without assessing their impact or effectiveness.

Components of the digital-age school house are emerging in learning objects, online assessment, web-based distance education, and software platforms that integrate them all. Implementing these new digital-age tools will make education and a wealth of knowledge more accessible. Many successful examples exist of the digital schoolhouse to research and incorporate in the traditional classroom in a step by step gradual process, assessing the effectiveness in a continuous cycle of improvement.

A questionnaire was administered to electronic-based program instructors in the WTCS, with the majority of respondents comprised in Electronics and Electromechanical Technology. The questionnaire revealed a widespread use of alternative delivery systems; the most common were Computer, Self-paced, and Instructional Television (ITV). While only 6% of respondents indicated Web-based as an alternative delivery system, they incorporated email, video, and testing components. The questionnaire data also revealed that LabVolt, NIDA and LJ are the most common computer based alternative delivery software. A significant majority (75%) expect alternative delivery systems to increase or greatly increase over the next 5-years. The one follow up question from a 1993 study indicated a significant increase in computer assisted instruction (CAI), up from 13% to 61%.

As we again transform education to provide the best learning experience and most highly skilled and learned graduates in the most efficient manner, one cannot ignore the tremendous potential of the digital information age and education. Education has already made great strides recently incorporating a more learner centric modality through use of multiple learning styles, multiple intelligences, and multiple assessment styles. We need not hastily jump upon the latest craze bandwagon, only to develop symptomatic amnesia. Yet this ***is*** more than the latest craze and failure to begin incorporation of digital technology will so severely weaken an institution as to make it unviable in an increasingly competitive educational market. Perhaps, multiple delivery techniques incorporating today's technology and alternative educational delivery strategies are but the next step in an ongoing transformation of education.

Technology is but a new tool; let us thoroughly study it in context before being completely overwhelmed by its seemingly infinite possibilities. Faculty should incorporate technology where appropriate and within existing course structures, thus taking advantage of both technology and the social aspect of education so highly valued by civilization today (i.e. Social skills, morals, teamwork, etc.). The two are not mutually exclusive, using technology should not rule out a traditional classroom, instead it should augment and increase its effectiveness.

Faculty cannot remain the sole knowledge providers as is traditional in many educational institutions today. We must not ignore the growing digital database of knowledge, that is indexed, searchable, and available anytime and any place. That is not to say faculty are obsolete, on the contrary, they are even more in demand. Faculty, as highly educated and skilled professionals, will be what separates one technologically advanced college from another. An example of this is what has happened in the medical field with expert systems, using technology, computers and databases to diagnose and prescribe for many complex and rare diseases. Medical specialists are still required if not more than previously, however, their skill set has expanded to incorporate a new tool–technology.

Conclusions

The current state of Alternative Delivery, reflected by the collected survey data, indicates Alternative Delivery is in wide use within Electronics programs in the WTCS. Ninety percent of the sampled Electronics faculty indicated they were using some form of alternative delivery within their respective program areas. The predominant alternative modes were “Self-paced” (37%), “Computer” (35%), and “ITV” (17%). While only 6% of faculty indicated, “Web-based”.

Recent projects, with local and national funding, are developing learning objects in the WTCS and University of Wisconsin System (UWS) providing additional alternative technological resources for faculty. A segment of the latest learning object project is creating objects specifically for the electronics area. Incorporating more web-based components into the curriculum will continue to be an ongoing challenge. Whether the course is Internet, intranet, or a traditional mix, developing/utilizing a learning object database, or incorporating an assessment database, the tools are now available.

Recommendations

It is not possible to completely simulate the quality educational experiences available today; instead we must incorporate these new technological tools and strike a helpful well-planned balance. The following recommendations are “first steps” that are possible today:

- Optimize traditional course strengths through incorporation of student groups/teams in the curriculum
- Incorporate a web-based structure (such as Blackboard) for current on-campus courses to provide a link for traditional course materials and integrate new web-based links and tools such as online testing.
- Develop a web-based Introduction course that meets the needs of core programs that would address a larger audience through its flexibility. Offer the course as a one-credit course that would be accepted in all core programs—providing a carrot for further study.
- Develop a web-based first credit of larger credit core courses. Use simulation for early labs but counter with mandatory hands-on labs for the next credit.

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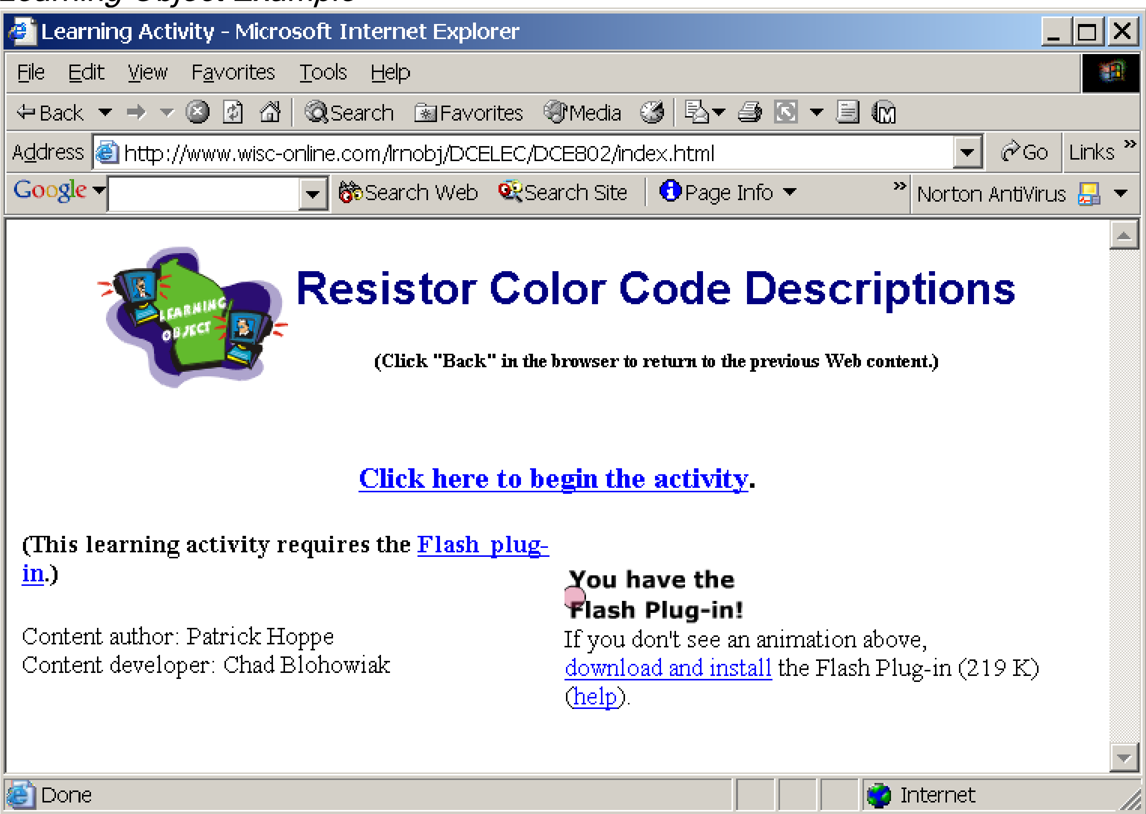
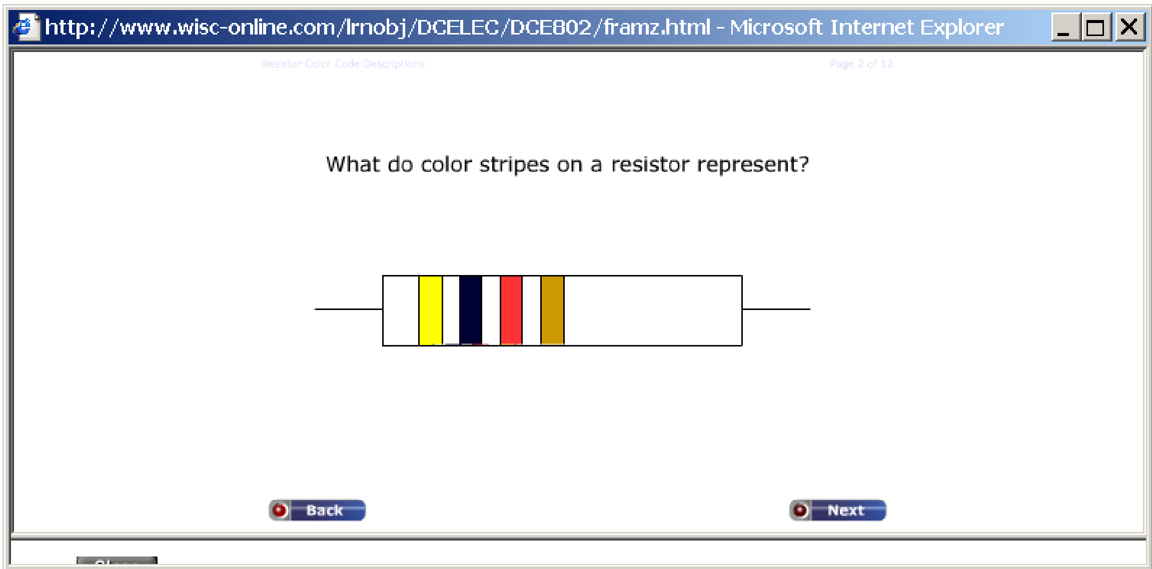
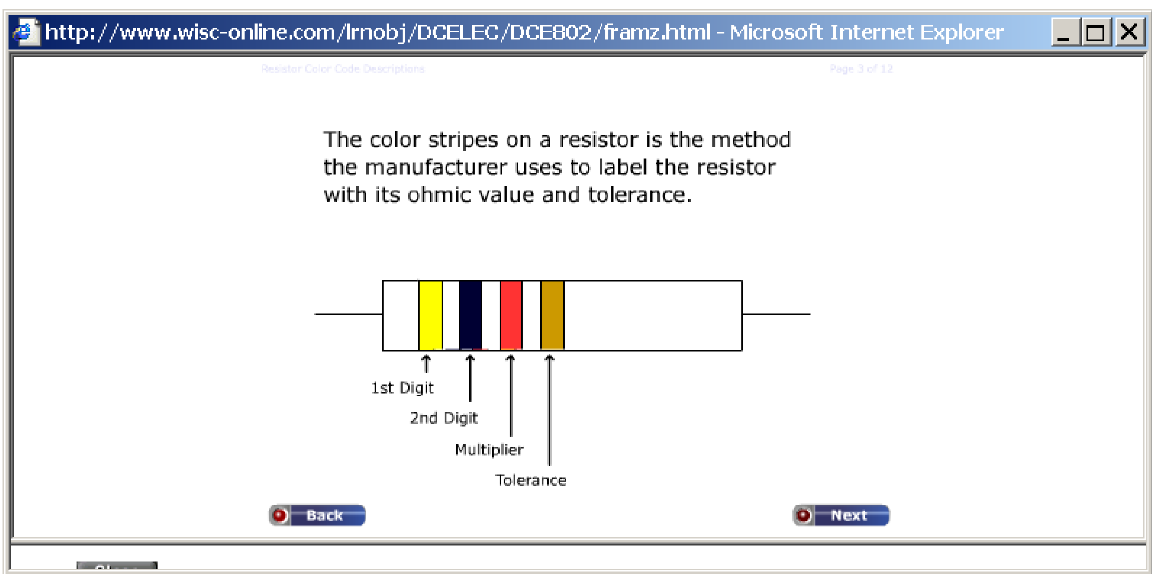
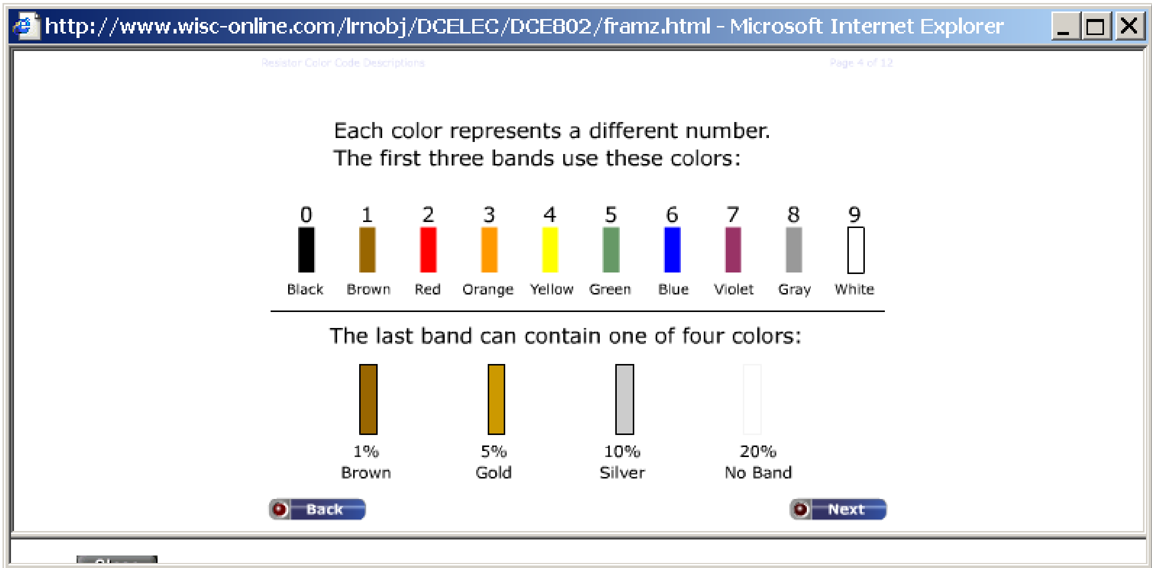
Appendix A

Learning Object Example

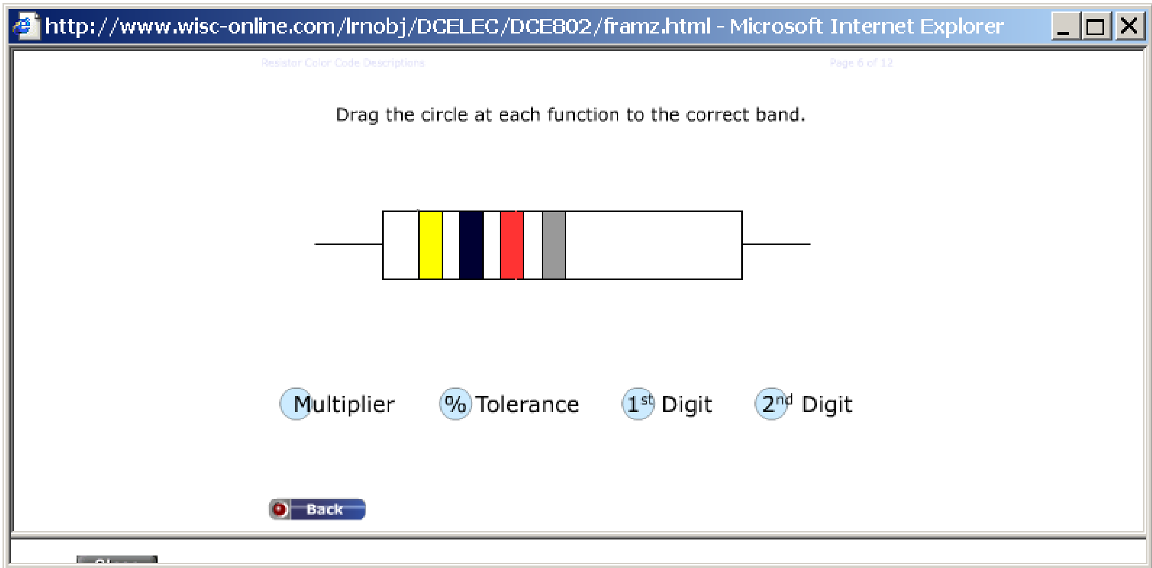


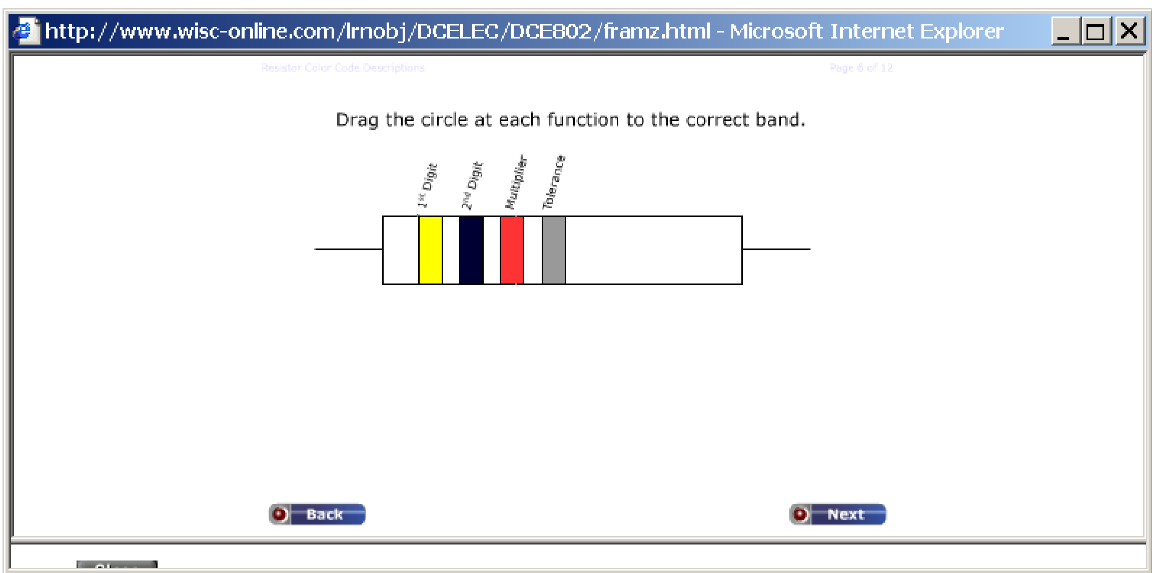

http://www.wisc-online.com/lrnobj/DCELEC/DCE802/framz.html - Microsoft Internet Explorer
What do color stripes on a resistor represent?
Back
Next

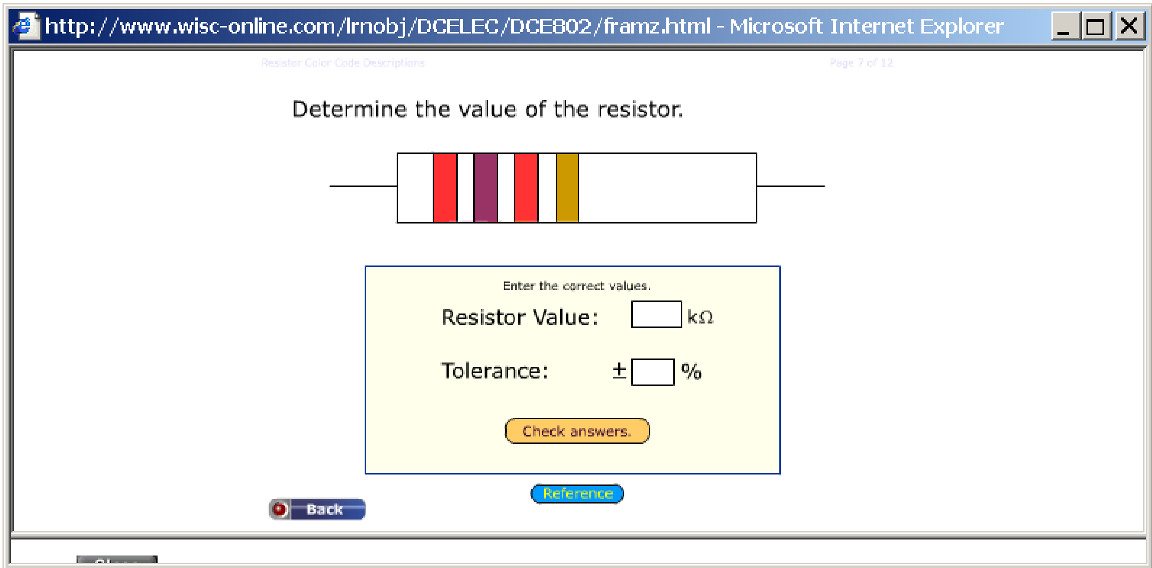

http://www.wisc-online.com/lrnobj/DCELEC/DCE802/framz.html - Microsoft Internet Explorer
The color stripes on a resistor is the method the manufacturer uses to label the resistor with its ohmic value and tolerance.
1st Digit
2nd Digit
Multiplier
Tolerance
Back
Next

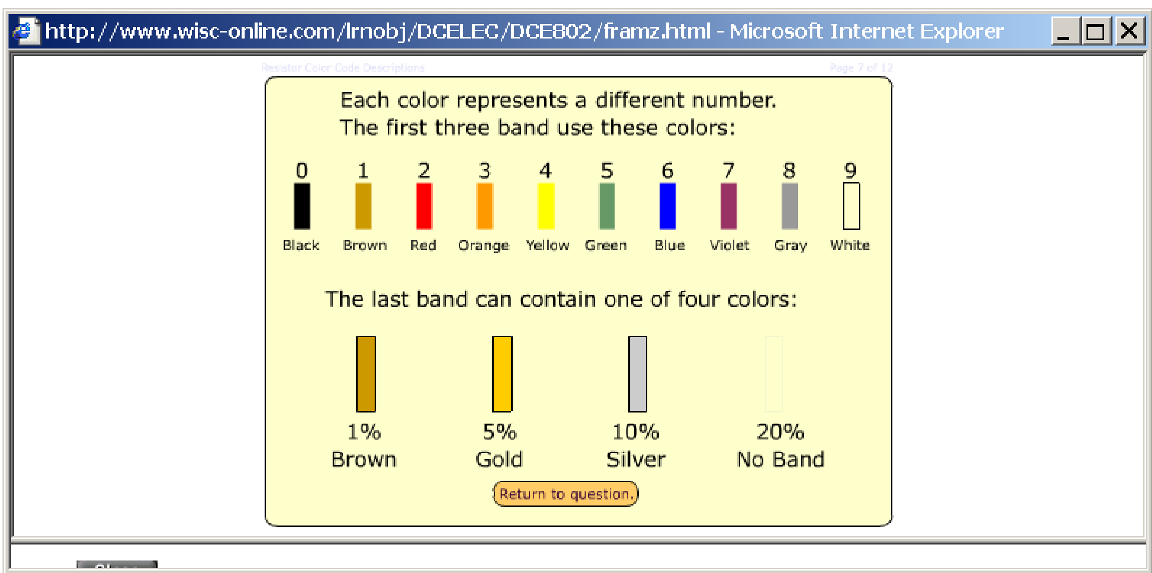

http://www.wisc-online.com/lrnobj/DCELEC/DCE802/framz.html - Microsoft Internet Explorer
Each color represents a different number.
The first three bands use these colors:
0 1 2 3 4 5 6 7 8 9
Black Brown Red Orange Yellow Green Blue Violet Gray White
The last band can contain one of four colors:
1% Brown
5% Gold
10% Silver
20% No Band
Back
Next


http://www.wisc-online.com/lrnobj/DCELEC/DCE802/framz.html - Microsoft Internet Explorer
The Multiplier Band
Black 1 x10^0
Brown 10 x10^1
Red 100 x10^2
Orange 1,000 x10^3
Yellow 10,000 x10^4
Green 100,000 x10^5
Blue 1,000,000 x10^6
Violet 10,000,000 x10^7
Grey 100,000,000 x10^8
White 1,000,000,000 x10^9
Back
Next


http://www.wisc-online.com/lrnobj/DCELEC/DCE802/framz.html - Microsoft Internet Explorer
Drag the circle at each function to the correct band.
Multiplier
% Tolerance
1st Digit
2nd Digit
Back


http://www.wisc-online.com/lrnobj/DCELEC/DCE802/framz.html - Microsoft Internet Explorer
Drag the circle at each function to the correct band.
1st Digit
2nd Digit
Multiplier
Tolerance
Back
Next


http://www.wisc-online.com/lrnobj/DCELEC/DCE802/framz.html - Microsoft Internet Explorer
Determine the value of the resistor.
Enter the correct values.
Resistor Value: kΩ
Tolerance: ± %
Check answers.
Reference
Back


http://www.wisc-online.com/lrnobj/DCELEC/DCE802/framz.html - Microsoft Internet Explorer
Each color represents a different number.
The first three band use these colors:
0 Black
1 Brown
2 Red
3 Orange
4 Yellow
5 Green
6 Blue
7 Violet
8 Gray
9 White
The last band can contain one of four colors:
1% Brown
5% Gold
10% Silver
20% No Band
Return to question.

Appendix B

Questionnaire

Fellow WTCS Electronics-based Program Instructor,

This research is designed to determine the extent of alternative delivery within electronics-based associate degree programs in the Wisconsin Technical College System (WTCS). In addition, alternative delivery techniques utilized will be studied. Finally this research will seek to quantify and contrast the amount of change in Computer Assisted Instruction (an alternative delivery technique) through a follow up of a 1993 study, "The State of Computer-Assisted Instruction within Electronic Programs in the Wisconsin Technical College System". Data gathered would be shared with technical division deans in the WTCS, who would be encouraged to share the research findings with their local instructors.

I understand that my participation in this study is strictly voluntary and I may discontinue my participation at any time without any prejudice. There is no risk to you in filling out this questionnaire as your responses are completely confidential.

Participants will benefit directly from the study by receiving alternative delivery statistics from similar programs statewide. This should help reduce duplication of effort and resources. As well as, highlight leading efforts in alternative delivery and stimulate discussion as to future scenarios in alternative delivery.

I understand that by completing this questionnaire, I am giving my informed consent as a participating volunteer in this study. I understand the basic nature of the study and agree that any potential risks are exceedingly small. I also understand the potential benefits that might be realized from the successful completion of this study. I am aware that the information is being sought in a specific manner so that confidentiality is guaranteed.

NOTE: Questions or concerns about participation in the research or subsequent complaints should be addressed first to the researcher second the research advisor and third the review board.

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Electronics-based Alternative Delivery Study is designed to ascertain and identify the extent of, and techniques used in, alternative delivery within electronics programs in the Wisconsin Technical College System (WTCS). Please place a check mark next to items when asked to identify and/or write in the blanks when necessary.

1. Program: ___Electronics ___Electromechanical ___Other:________________

2. Overall percentage of alternative delivery (non-Lecture/Lab format) within program:
   ___0% (see #) ___1-10% ___11-20% ___21-30% ___31-40%

   ___> 40% (list: ___%)

3. Identify all alternative delivery in use:
   ___Web-based ___Instructional Television ___Computer-based Instruction

   ___Self-paced ___Other(s): ____

4. If using web-based delivery,
   A. Please list authoring software: __________________________________

   B. Is email used for course correspondence? ___yes___no

      If yes, list weekly time spent processing: _____hours

   D. Do you use online testing for course assessment? ___yes___no

      If yes, are pre and post tests included? ___yes___no

   E. Are video components used? ___yes___no

   F. Are online chat sessions used? ___yes___no

   G. Are minimum student system requirements identified? ___yes___no

      If yes, please list hardware required:
      ____

      ____
      Software (include browser & applets)
      ____

      ____

5. If computer-based delivery please list software package:

____

6. In the next five years do you expect alternative delivery to?

___Decrease Significantly ___Decrease ___Remain Constant ___Increase ___Greatly Increase

7. List the overall percentage of Computer Assisted Instruction (CAI) to non-CAI used in your program: ________ % CAI