1994

Getting Noticed: College Recruiting Using a New Media

Walter John Flick

GETTING NOTICED
COLLEGE RECRUITING USING A NEW MEDIA

Walter John Flick BS

A Culminating Project Presented to the Faculty of the Graduate School
of Lindenwood College in Partial Fulfillment of the
Requirements for the Degree of
Master of Science

1994

COMMITTEE IN CHARGE OF CANDIDACY:

Professor Michael Castro
Chairperson and Advisor

Assistant Professor Daniel W. Kemper

Adjunct Associate Professor Ben Kuehnle

Dedicated to my wife Maria and children Angela and Matthew who have eaten many dinners alone while Dad goes to school.

Table of Contents

List of Tables

List of Figures

Chapter One
Introduction

INTRODUCTION

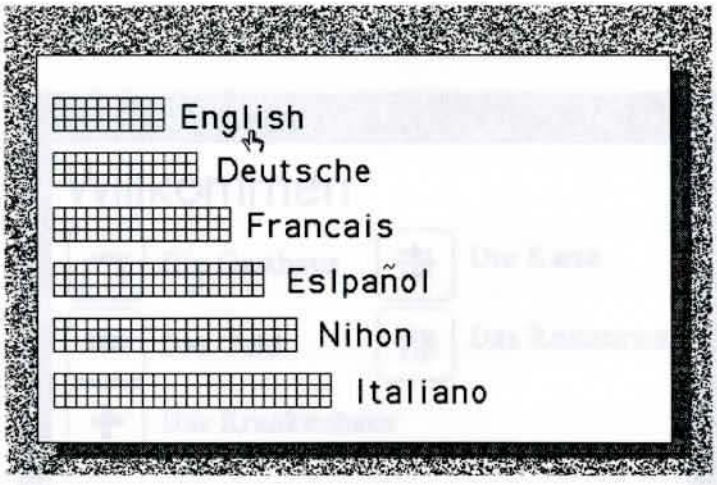
Ever since the invention of computers, science fiction authors have written prophetically about huge omnipotent computers that would dominate the world, scrutinizing and judging every aspect of human existence.

Most of these stories end however with the blame not being placed on the computer, but the evil mad scientist. The computer after all is just a tool since everyone knows a computer can't do anything that a programmer hasn't instructed it to do. This implies interactivity at the most basic level of computing, a programmer enters an instruction, the computer performs that instruction and returns a result.

This project deals with interactivity at a higher level, although the order of events remains the same. Consider this scenario:

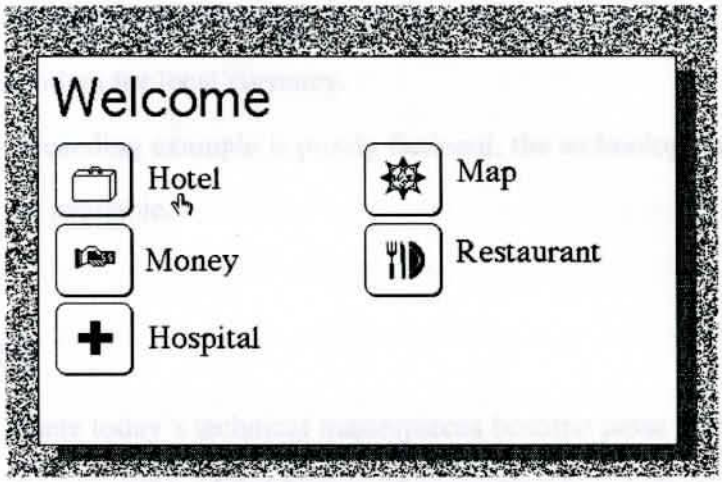
A traveler arrives at a foreign airport and while walking down the concourse encounters a bank of computer screens. As the traveler approaches, one turns on and displays:

Figure 1



The software designer has essentially made the first move by making the kiosk attractive and enticing. Once the traveler issues an instruction by touching the "ENGLISH" button. The computer responds to that instruction by displaying this screen:

Figure 2



By touching the "DEUTSCHE" button would receive this screen as a result of the instruction:

Figure 3

By touching the "HOTEL" button the traveler would see a map with various hotels located on it. Touching an individual hotel would bring up screens with information about the hotel, color photographs of the facilities, and video of attractions close to the hotel. Using a keyboard and credit card reader the traveler could book a room, pay for it, and summon ground transportation to the hotel. Touching the money button and using the credit card reader, the traveler could even exchange dollars for local currency.

While the preceding example is purely fictional, the technology needed to produce it is now available.

History

In an era where today's technical masterpieces become passé and boring within a year, if not months, a brief history of computing is in order to both fully appreciate the power modern computers can access and act as an aid in extrapolating the future of interactive technology.

Nothing drives technology like a good war and like many other technologies, the race to build bigger and more deadly weapons gave a big boost to the fledgling computer industry. Computer pioneers John Mauchly and Presper Eckert are profiled in Robert Slater's book, *Portraits in Silicon.* Mauchly and Eckert's first major contribution to computing was ENIAC. This thirty ton behemoth, eighty feet long, eight feet high, and three feet wide could calculate in twenty seconds what would take other machines forty hours. Mauchly and Eckert had more basic problems though, one of them, preventing mice from eating the insulation on miles of wire. Mice aside though, this extraordinary computational power helped speed the development of the A-Bomb, and the end of World War II.

Quickly ENIAC was eclipsed. Starting a trend that continues today, Mauchly and Eckert designed BINAC to be smaller and more powerful than its successor ENIAC. Writing about BINAC in his book, *Giant Brains or Machines that Think,* Edmund Berkeley gushes:

> This machine has some remarkable properties. It does addition or subtraction at the rate of 3500 per second. It does multiplication or division at the rate of 1000 per second... Finally, BINAC is only 5 feet high, 4 feet long, and one foot wide. (179)

Even though the technology existing in 1949 was crude by today's standards, Berkeley makes some very accurate predictions of uses for the infant computer: an automatic address book, business and weather forecaster, automatic thermostat, and automatic typist. Today millions of people use computer data bases, scanners, and tune into computer assisted TV weather forecasts.

Seymour Cray, father of super computing, has built some astounding machines. One of Cray's fastest computers is the aptly named CRAY-2. This super computer, a scant 54 x 45 inches, runs at a speed of 1.2 gigaflops or 1 billion, 2 million operations per second. This incredible speed didn't come easy though. A major problem was keeping the heat generated by the computer from melting the components. To correct this flaw, Cray flooded the inside of the CRAY-2 with a nonconducting liquid coolant, Fluorinert. This arrangement earned CRAY-2 the nickname, "The aquarium". The CRAY-2 is now able to solve in one second a problem that would take a year in 1952. Stalled by defense budget cuts the CRAY-4 sits on the drawing boards, its 128 gigaflop or 128,000,000,000 operations per second speed yet unproven. 43 years ago Edmund Berkeley called 3500 operations per second, "Remarkable" (Berkeley 179).

HYPERCOMPUTING

60 years of computer evolution has seen numerous people who have pushed and pulled the technology into new directions. One of these people was Dr. Vannevar Bush, Director of the United States Office of Scientific Research and Development. In an article titled "As we may think" in the July, 1945 issue of the *Atlantic Monthly,* Bush wrote about his frustration with existing computer technology.

> Our ineptitude in getting at the record is largely caused by the artificiality of systems of indexing... The human mind does not work that way. It operates by association. With one item in its grasp, it snaps instantly to the next that is suggested by the association of thoughts, in accordance with some intricate web of trails carried by the cells of the brain. It has other characteristics, of course; trails that are not frequently followed are prone to fade, item are not fully permanent, memory is transitory. Yet the speed of action, the intricacy of trails, the detail of mental pictures, is awe-inspiring beyond all else in nature...

Bush's solution for this problem was the memex.

> Consider a future device for individual use which is a sort of mechanized private file and library. It needs a name, and, to coin one at random, memex will do. A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. (Horn 252–253)

The memex, a planed collection of buttons, microfilm readers, cameras, and display screens bolted together to resemble a desk is considered by Robert E. Horn in his book, *Mapping Hypertext*, to be a forerunner of today's personal computer.

Even though Bush's memex provided subject matter for much speculative discussion, computers, still in their developmental infancy, were too large and underpowered to put a memex on an average desk.

It was not until 1965 that the technology Bush dreamed of in the 40's had a name. Starting a project that continues today, Ted Nelson coined the term "hypertext." Writing about Nelson's Zanadu system in his book, *Hypertext & Hypermedia*, Jacob Nielsen bluntly states Xanadu's scope:

> The basic Zanadu idea is that of a repository for everything that anybody has ever written and thereby of a truly universal hypertext. Nelson views hypertext as a literary medium and believes that "everything is deeply interwingled" and therefore has to be on-line together. (Nielsen 33)

Ted Nelson's vision of Zanadu has every piece of information ever written linked to every other piece. While at first glance Xanadu seems an impossible goal, but some of the pieces are starting to fall in place. The Internet now has millions of users and is growing at the rate of 20% per month. Internet advances a Xanadu system in two ways. First, it provides a way to access such a database. Second, the vast amount of storage required to record every bit of information ever written, with billions of works added every day, preclude storing all this data in one place. Internet serves as a good model for this type of distributed information storage.

The other side of the problem is providing material to access. The past few years have seen advances in this area as well. All sorts of media are being digitized every day, both newly produced and existing works. Given the pace of digitalization Xanadu might be a bit closer than it seems on the surface.

In 1978, Andrew Lippman of MIT took hypertext one step further with the production of the Aspen Movie Map. This hypermedia system provided users with a simulated drive through the city of Aspen, Colorado. To produce the simulation, Lippman and his team drove the streets of Aspen in a truck with four

cameras mounted at 0°, 90°, 180°, and 270°. While driving, the cameras clicked off panoramic pictures every 10 feet. When transferred to videodisk the photo's produce a virtual drive through Aspen. The interactivity provided by the computer gives the user the ability to make a decision and alter the course of the movie by turning at intersections. Additionally, since the interiors of several buildings were filmed, the "driver" could exit the car and explore inside as well (Nielsen 36).

Using experience gained while producing the Aspen Movie Map, Lippman went on to tackle a more practical hypermedia system. The Movie Manual uses hypermedia to link text of auto and bike repairs to video clips of experts actually performing the repairs. Along with additional footage of consequences if repairs are done wrong. Nielsen gives testimonial to the power of linking text to pictures.

> One memorable sequence, which I still recall from seeing it in 1983, is a video clip of what would happen if certain nuts were loosened too rapidly. The film shows the oil pan slipping and discharging its contents all over the head of the poor mechanic. After having seen this sequence, you use your wrench cautiously for a long time. (49)

Most of these early hypertext and hypermedia systems were designed to show the value and viability of the new technology and were lucky to ever be seen outside the confines of research institutions. The first use of a hypertext application was in 1985 with the shipping of the Symbolics Document Examiner. The Document Examiner was produced as an alternative to the manual for high-powered Symbolics Workstation computers. Considering the fact that at the time the printed version took 8,000 pages, users found the on-line version significantly more manageable. Since hypertext was still a relatively new concept, even for computer users, the Document Examiner was produced using a book metaphor including sections and chapters. The application even had the capability to place "bookmarks" for sections to be reviewed at a later time (Nielsen 38).

By 1987 computers had advanced to a point that a powerful easy to learn tool for creating hypertext documents was available to the average user. That tool is HyperCard.

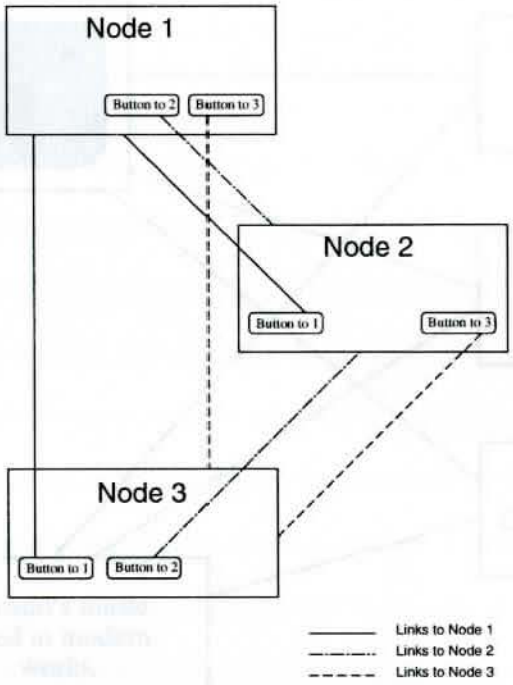
Compare Bush's remarks with a those made by Bill Atkinson in May, 1987. Atkinson, a software engineer at Apple Computer, is the creator of HyperCard. He was interviewed in 1987 by Danny Goodman for Goodman's book, *The Complete HyperCard Handbook.* When asked how he would describe HyperCard, Atkinson replied,

> HyperCard is an authoring tool and an information organizer. You can use it to create stacks of information to share with other people or to read stacks of information made by other people. So its both an authoring tool and sort of a cassette player for information. (Goodman 851)

Forty two years earlier Dr. Vannevar Bush might have called it a "...device for individual use which is a sort of mechanized private file and library."

In order to simulate the associative nature of the human brain, Bush's memex system used many of the concepts that have since been termed hypertext. Horn defines three essential parts of a hypertext system; nodes, buttons, and links (Figure 4).

A Simple Hypertext System
Figure 4



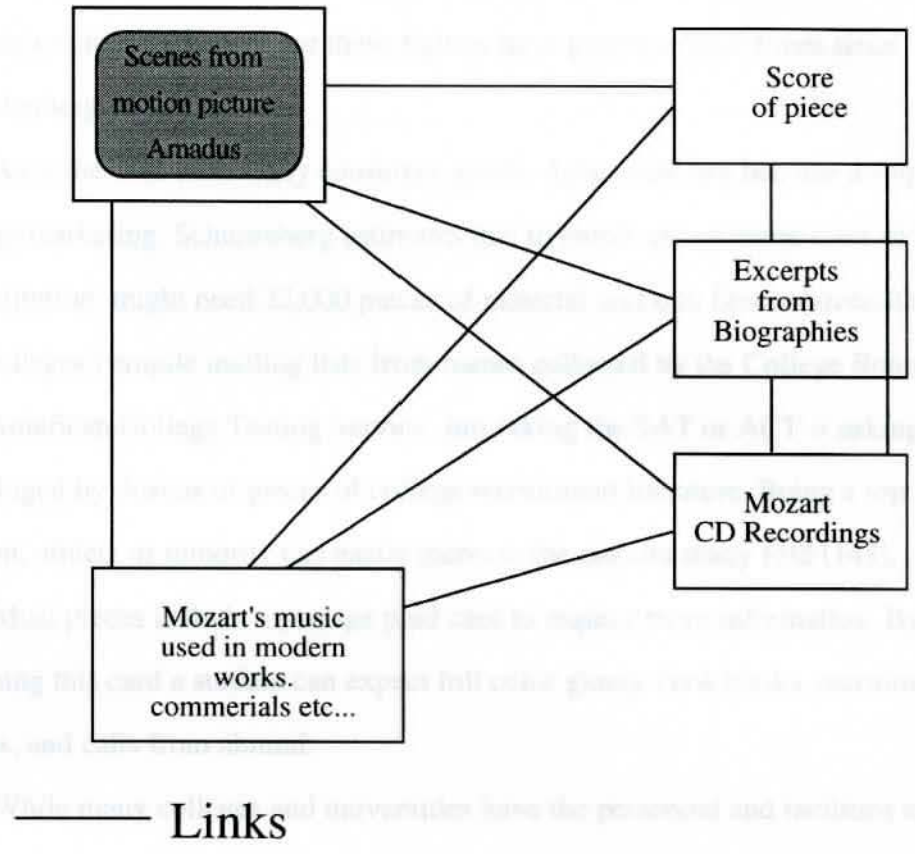
A node is an individual information storage space. In a hypermedia system a node might include text, a sound, a picture, or video clip (Figure 5). Horn points out that,

> At present, the node is not a well defined concept except in certain very structured contexts. One node may include composite nodes where, for example, a node is a subnode. Nodes may have different display metaphors, such as cards, pages, windows. (9)

The power of hypertext and hypermedia systems is in the links. Almost self-explanatory, links are the electronic paths the computer follows to travel from one node to another node.

Buttons provide a way for users to issue instructions to the computer. For the most part buttons are used to initiate links from one node to another node, but may be used to perform computations, or exit the program.

A Complex Hypermedia System
Figure 5



A Use Closer to Home

Browsing a periodical database in any library will turn up a myriad of articles discussing the race that has developed among American colleges and universities to recruit students. In an article for Money magazine Eric Schurenberg writes on "The Agony of College Admissions". Several reasons exist for the escalating battle over college bound high school students. Top colleges have always been aggressive in recruiting top students, but Schurenberg points out that a shortage of high school graduates has forced all institutions to put on their

selling hats and pitch to potential freshmen. Figures cited include a 64% increase in marketing budgets from 1980 to 1986, and an average cost of $1,700 to lure each new student. Chances are these figures have grown several times since (Schurenberg 144).

As is the case with many consumer goods, direct mail has become a staple of college marketing. Schurenberg estimates that to enroll an incoming class of 500, an institution might need 22,000 pieces of material sent out. Since universities and colleges compile mailing lists from names collected by the College Board and The American College Testing Service, just taking the SAT or ACT is asking to be deluged by dozens of pieces of college recruitment literature. Being a top student, athlete or minority can easily increase the amount many fold (148).

Most pieces include a postage paid card to request more information. By returning this card a student can expect full color glossy view books, recruitment videos, and calls from alumni.

While many colleges and universities have the personnel and facilities to produce collateral materials on campus, most choose to have them professionally done. This is a puzzling decision. In-house production provides potential students, especially ones interested in communications, a concrete example of what's being taught and the capabilities of the students and facilities on campus. Another plus for in-house production is cost. Professionally produced, a typical full color viewbook can cost $3-4 each. A quality 10 minute video tape with plenty of digital effects and trendy soundtrack expected by the MTV generation can quickly top $25,000 (Schurenberg 150).

The Draw of Electronic Documents

Considering the previous examples, the average high school senior receives any number of sales messages, via several media: paper, video, etc. The use of electronic documents is far from widespread at this time, therefore, the uniqueness of an electronic catalog cuts through the clutter of other videos and viewbooks simply by its media. As the technology moves out of its infancy, electronic documents will become more wide spread and an interactive catalog will loose some of this uniqueness. The real advantage will continue to be the flexibility of electronic documents. This flexibility will be discussed further in later chapters.

The purpose of this thesis is to show how a college can use an electronic document to cut through the mass of recruiting materials and make an impact on potential students.

CHAPTER TWO
REVIEW OF LITERATURE

INTRODUCTION

Most major advances in technology follow about the same evolution.

1. Introduction and availability of the product.
2. Acceptance of product by certain people, (usually the ones who can afford it).
3. Increases in sales lowers the unit cost.
4. Widespread acceptance.

Countless examples that followed this evolution exist: the automobile, the microwave oven, and personal computer.

When one breaks down a major technology into its component parts the same evolution can be seen. Early in the life of personal computers a hard disk drive to store information was considered a high priced novelty. Now, to all but the most basic computers, an 80MB hard drive is considered a minimum. Several other peripherals are following suit. The use of a mouse, CD-ROM drives and modems are quickly becoming mandatory. A modem enables one computer to communicate with another computer via telephone lines. This capability will forge personal computers into what Blayne Cutler (25) in *American Demographics* magazine calls the fifth pillar of modern communications. The other four pillars include television, radio, newspapers and magazines.

Richard Adler, vice-president for development of SeniorNet believes that on-line interactive systems will "close the gap" allowing customers to receive advertising messages, request more specific information, and pay for the product all at one place (Cutler 26).

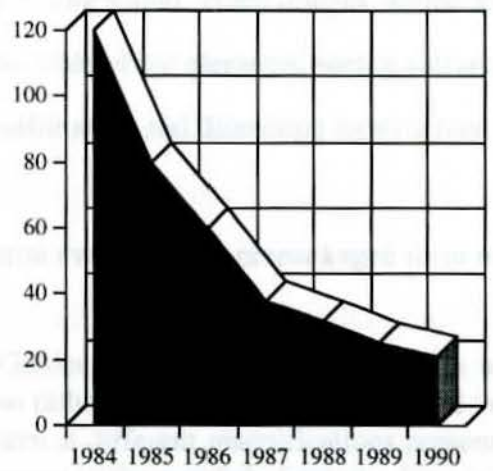
A concrete example of this method of selling can be seen in the mens shoe department of several local department stores. Florsheim Shoes utilizes an inter-

active kiosk to show and sell it's entire line of shoes without the associated floor space. By using a color video touch screen, the customer selects what kind of shoe he wants to look at (dress, casual, etc.). When selected, various styles are displayed on the screen along with the available sizes, widths, colors, and price. The customer is given choices to view other shoe styles, buy a pair of shoes, or exit the program. If the customer chooses to buy a pair, the kiosk is equipped with a credit card reader and a keyboard. The reader scans the card and the customer keys in his address for future delivery.

EDUCATION

Perhaps one of the most exciting uses of interactive technologies is in the field of education. Numerous studies have shown that the more senses used when learning, the better the retention of the material. Multimedia gives students the opportunity to use sight, sound, and text, at their own pace, to provide a rich learning environment. Much of the growth in interactive applications in education has to do with the proliferation of computers in the classroom. Ten years ago the student/computer ratio was about 125:1. Today that ratio is down to about 22:1 (Rogers p. 52). (Figure 6)

Figure 6
Students per computer



Source: (Rogers 52)

Educators are using these technologies in any number of ways, from having students create their own simple HyperCard stacks, to complex simulation games and applications.

HyperCard is widely used in schools. Since it is somewhat easy to learn, many educators are creating their own stacks to go along with their curriculum. Some of the advantages include:

Figure 7
Advantages of HyperCard

- Introducing a unit of study. For example, an introduction to earth science.
- Culminating a unit, reviewing important concepts. For example, a review of static and current electricity.
- Demonstrating experiments with materials too difficult or dangerous to work with in class.
- Illustrating a concept difficult to comprehend. For example, the Florida estuary system.
- Developing a new form of testing for understanding. For example, one question with a correct response branches to the next question; an incorrect response sends the student to a review of the concept tested.

Source: (Parker 29)

Science teachers see multimedia of particular help in presenting difficult or abstract subject matter. Using sound, video images, animation, and text students can explore the periodic table of the elements, seeing sulfur mined, uses of sulfur, even getting inside a sulfur atom and dissecting its structure.

Some of the material available in a prepackaged form include:

> • Dissections- Guides through eight full dissections using a computer mouse rather than a scalpel. Labeled and unlabelled photographs taken at different magnifications present multiple views of each organ in the crayfish, fetal pig, frog, earthworm, mussel, squid, sea star and perch. Also shown in quiz format.
>
> • Family Tree- Graphically maps out the organization of all living organisms presenting the five kingdom phylogenetic tree. Photographs and movies of representative species of each major group pop up on the video screen as their "button" is selected.
>
> Other titles include, *Atoms to Anatomy, Physics at the Indy 500, and Doing Chemistry.* (From the VIDEODISCOVERY catalog)

More ambitious students may want to try their hands as mayor of a computer generated city with SimCity. This simulation game lets users run there own scenario, or test themselves trying to reduce the impact of historical disasters such as the 1906 San Francisco earthquake. As the mayor, the user makes decisions on how to run the city, build more roads, pay off debt, build housing, etc. But, each of these moves require money in the form of taxes, raise them too much and reelection can be uncertain (Jacobson 14–15).

Of course not every student is going to be mayor of a city, a more practical interactive simulation is Magnus Communications TIP-DART for, Target Interactive Project, Drug and Alcohol Responsibility. TIP-DART uses a videodisc with

footage from a party. During the party, revelers are given choices to indulge in various drugs and alcohol. At these points the picture freezes and choice boxes are shown on screen, take the drink or drug or leave them. After a choice has been made the video jumps to a screen so the user can see the consequences of that choice. TIP-DART has won numerous awards and is now in use by the government of Canada (Caruso 76).

HOT, HORNY & HEALTHY is another social scenario game that is being placed into gay bars around San Francisco.

> Seeing a barroom on screen, players click on any one of six love seekers to start a conversation, then click on responses to carry it on. All conversations lead to condoms and HIV status, and if anyone suggests unsafe sex, Rubberman arrives to explain why it's a bad idea. (Garrison 125)

In addition to being used as aids in the actual instruction of students, electronic media is also being used to lure potential students to attend colleges and universities. As mentioned in Chapter One, the growing scarcity of college bound high-school students is forcing institutions to sell themselves much like time share condominiums using direct mail and expensive video tapes. While prospective students still value the traditional on campus visits when making final decisions, direct marketing has shown some positive results in creating initial interest with students that may not be aware of a particular school.

> James McInerney, a senior at Long Island's Bethpage High School, has started getting more and more direct mail from schools. He noted that some of it is reviewed and put aside. Some schools he was unaware of piqued his interest with direct mail pieces. "Some of the brochures are quite descriptive and tell a lot about the school. The color photos give your a feel for what the campus is like," he said.
> However, McInerney, who still is not sure where he will go, says a campus visit will be conducted before he makes any concrete decisions. (Wojtas 30)

Direct mail seems to be especially successful when used by small lesser known colleges. Hamilton College in New York has seen response rates as high as eleven percent to direct mail. Another New York College, Iona College attributes much of the enrollment growth from 4,000 to 6,251 over a ten year period to direct mail campaigns that includes traditional viewbooks and videos (Wojtas 31—32).

The use of recruiting videos has become so widespread it has spawned a small, but unique new industry. Search by Video weeds through existing college videos and for a price of $4 per school will dub requested videos onto a single tape. The service has become so successful that founder Shelly Spiegel now offers versions for boarding and summer schools (Diamond 1—29).

One of the first institutions to carry electronic recruiting one step further was the U.S. Army. During 1991 the Army produced an interactive ad that included information on ROTC, financial benefits, career opportunities, and the ability to figure the dollar benefit of attending school on one of the Army's programs. J.G. Sandom of Einstein and Sandom, Inc. produced the ad for the Army noting that "It's becoming increasingly difficult to market to high school students using traditional marketing media". The ad was compatible with IBM PCs and Apple Macintosh computers. The Army reports a response rate two times the rate of traditional brochures (Wojtas 48).

Search by Video may have a name change in the offing according to Fred Zuker, author of *Peterson's Guide to College Admissions.* Due to the relative ease of updating and low cost of duplicating verses video Zuker sees interactive computer disks replacing videos soon. Students considering Tulane University now have a chance to gather information about the institution via a computer disk. The interactive disk includes a campus map, information about the colleges, pictures of the campus and a blank application that can be filled out printed and mailed

back. Other schools that use disks in their recruiting efforts include The University of California-Davis and Worcester Polytechnic Institute (WPI) (Hebel S8).

In addition to interactive disks, Carnegie-Mellon University, Tufts University and WPI allow computer generated applications. Executive director of enrollment management at WPI, Bob Voss, states that "The academic level of the students who apply by diskette has been higher that those who apply by paper" (Hebel S8).

Another computer based marketing tool is CollegeView a network of college information available to high school students that includes data on 1,600 colleges (Hebel S8).

SALES/MARKETING

"Your most effective sales tool is already sitting on your customer's desk... It's marketing for the 21st century." So says Howard Weiner, owner of Video 35 when speaking about interactive marketing. (Hartmann 60) Sales people have traditionally been the vanguards of finding new ways to sell things through the use of new media. One of the first wide spread uses of interactive computing was automatic teller machines or ATM's. According to Mitch Betts in the article "Self-service a growing trend for customers" for *Computer World* magazine, many people worried that when ATM's were introduced in 1971 they would be too impersonal to be successful. Just the opposite was true, many banks found their market share increased because of them. Now banks are considering using ATM's to help customers reorder checks, cash checks, and buy insurance policies (Betts 16).

Following the lead of banks, some hotels frequented by business travelers are installing automated terminals to help ease the crunch at check in desks. According to Terry Breen, guests at Opryland Hotel in Memphis Tennessee, have the option to check out using terminals in the lobby or via the televisions in their rooms. During the last eight months of 1991 40% of the guests using credit cards used the automated system. That equaled 13,500 check-outs. Other hotels are incorporating additional features into their automated systems. A Sleep-Inn located in Virginia offers check-in services for credit card users. Working in tandem with the electronic locks at the motel, guests insert a credit card to check in and the system then uses the card number as the key code for that room. To enter the room the guest merely slides the card through the reader at the door. Betts points out that some hotels are dismissing the idea and plan to keep the "warm, personal greeting" intact by using warm personal people behind the front desk (41–42).

Other sections of the travel industry are now beginning to realize the potential of interactive multimedia. Evan's World Travel in Long View, Texas has created ROSE. ROSE, short for (Remote Outside Sales Employee), has been installed in a Dallas grocery store. Shoppers can request information on various trips and print out details to take with them. Godwin says that more elaborate systems exist at the offices of travel agents. Discovery, a system that has been in use since 1986 includes a television monitor, computer, and laser disc player. Agencies receive up-dated discs in three categories: cruise and tour, destination, and a hotel data base, through the mail. Using this system, prospective travelers can view pictures of their destinations as well as accommodations at those destinations (Godwin 45).

The traditional view of college students being poor is quickly becoming outdated. Credit card companies realized this in the mid-1980's and have been actively selling to this group ever since. Other companies have seen the success of this strategy and are jumping on the band wagon. MarketSource Corporation is test marketing its interactive kiosk, InfoSource, at Indiana University. InfoSource provides the kiosks to the campus free and makes profit by selling ad space on the kiosk. The kiosks show commercials from companies such as AT&T, IBM, and Reebok, previews television shows and movies, and provides campus information such as maps, and calendars (*Advertising Age* 2/17/92 S14).

Retailers are now using computers to aid customers. A major player is K-Mart who is putting the "blue light special" on-line (Crump 1). Spinning off a Wal-Mart project that replaces large and often dog-eared parts catalogs with an interactive kiosk, K-Mart uses the kiosks in five departments. Shoppers in the home electronics department can obtain information about cameras, stereos, phones, as well as preview clips of compact discs and video tapes. A kiosk at the front doors can display maps of the store, weekly specials, and where those specials can be found. Roving "blue light special" kiosks provide coupons for a number of different products. Crump cites support for the kiosks from store personnel: "Buyers see the kiosks as ideal promotional tools. Sales associates say kiosks will answer basic questions, leaving them free to assist with more complicated questions." (31) .

While use of interactive kiosks for direct selling is growing, by no means is it the only way these technologies are being used by business. Public awareness campaigns have long been used as secondary sales messages by companies and are served very well by the multimedia capabilities of kiosks. One of the pioneers of this use is Ben & Jerry's ice cream (Hutsko 53). Visitors at the Vermont headquarters and plant have the chance to view "The Ric & Joe Show", for creators

Ric Dryfoos and Joe Wilkins. The interactive show was originally created to give some of the 30,000 people a year who take guided tours of the plant something to do while waiting for the tour to start. The presentation shows the various steps in the ice cream making process, most of which the visitors will soon see in person, but as Dryfoos points out, "People who attend the tours on Sunday won't see the blending process because the employees who perform that process are off on Sunday." Other information included in the presentation include video clips from Ben & Jerry's sponsored music festivals, and microbrewery. A short movie details the company's efforts to save the Brazilian rain forest, the only source of nuts used in the flavor Rainforest Crunch. Also included is the obligatory catalog of Ben & Jerry's souvenirs. As of May, 1992, only one kiosk was in operation, but plans are underway to instal a kiosk in every Ben & Jerry's store.

Closer to home, Union Electric operates an interactive video kiosk at it's Callaway nuclear plant in Reform, MO. Serving much the same purpose as the Ben & Jerry's kiosk, "The "Touch Tour" provides visitors with an overall view of the plant and allows them to "see" areas that are restricted to the public"(*St. Louis Computing*).

Even closer to home, in fact, in the home, any person with a PC compatable computer may play a copy of Buick's interactive golf game (Advertising Age pS1). After the 18th hole, players have a chance to see, hear, and learn about all the current Buick models. To receive a disc, customers must mail in a direct mail piece or respond to advertising. Buick estimates that a mailing of 150,000 discs results in the sale of over 1,000 cars. Other car makers are hopping on the band-wagon and Chrysler now offers an interactive disk for the Jeep line (PC Magazine 30). Potential car buyers using the disk get to play a game.

> A game called PhotoQuest puts you behind the wheel of a Jeep Grand Cherokee in search of wildlife photographs; you need to exploit the features of your Jeep to traverse the off-road terrain and snap the perfect picture. (Grimes 30)

Advertisers know that to be successful, an advertising medium has to have the ability to be piped, in some way, into people's homes. Newspapers, magazines, radio, television all poses this ability. If interactive ads were to become more than just a fad, they needed a way to get into the home also. The Buick golf disc made progress on this goal, but the June 22, 1992 issue of *Forbes* was the first wide spread use of an interactive computer disc (*Advertising Age* June 29, 1992). This disc was bound into the issue and offered readers a chance to view, on a PC, interactive ads from ten companies. Other companies use the medium in concert with direct mailings (*Desktop Communications* p28). Even the Army has recruited with interactive ads.

TRAINING

"General Mills' customers expect every Cheerio to be perfect: good tasting, round, and milk resistant." So says General Mills training director Jack Hess (Hess 16–17). In an attempt to reach that lofty goal, Hess has instituted an interactive training system at the Buffalo, New York plant. Workers now use a system that consists of a computer, touch screen, and actual photographs of the machines that the employees use. This system replaces the one-on- one training the company was previously using. Hess describes a major advantage of the new computer based system this way:

> For many years, machine-operator training at the General Mills cereal plant consisted of one-on-one instruction, a time-tested method that nonetheless has pitfalls. One of the main drawbacks in that information can get lost. When trainers or veteran operators leave the plant, their expertise leaves with them. We believe we have found a way to regularly retrain our operators without relying on one-on-one instruction. (Hess 16)

To produce a quality product, General Mills stresses the understanding of the entire cereal making process, from the time the grain enters the factory to the time the full boxes ship out the door. The computer system makes it possible to incorporate graphics into the training and give a better view of the big picture. Hess believes the system serves several different goals. Since most of the interaction is accomplished by using the touch screen, employees with a phobia for computers are less likely to worry about pushing the wrong button. Hess also hopes that using computers in training will help ease the fear of some when computers are introduced to the production floor in the future (Hess 16–17).

Consumers also expect their cars to be perfect, or at least start when they turn the key. Fifteen years ago, the owner of a sluggish car might drag out a few wrenches and screwdrivers and tinker over the weekend, but the days of the shade tree mechanic are numbered. In fact as the manager of service training for Honda America, John Ball, puts it:

> ...the fact is, a two-year course in automotive repair at a local community college is not going to suffice for our repair needs, or anyone else's these days. There's constant change, Constant upgrading. And constant need for training and retraining. (Ladd 8)

In an effort to make their training as efficient and timely as possible, Honda and other manufactures have instituted interactive training systems for use by service personnel. The complexity of modern automobiles has forced many

mechanics down the same road taken by physicians, specialization. At Ford the Intelligent Video Learning System, or IVLS, uses a videodisc and computer to train service personnel. This system also keeps key punching to a minimum by using a light pen for the majority of input.

> ...the technician answers questions, makes decisions and performs simulated diagnostic procedures. Students trace an electrical circuit to pinpoint a problem, disassemble or assemble a piece of equipment, connect test equipment for diagnosis, or check fuel delivery. (Ladd 9)

As with General Mills, Ford had concerns about the older technicians who had not grown up punching keys on remote controls and VCR's accepting this type of training method. While those fears may have been valid to some extent, the older technicians had other problems that were addressed quite well by the system.

> ...it turns out that the older guys are afraid to ask questions in our training centers. They just shrink into the background. IVLS gives them a chance to learn without embarrassment, and they've really taken to it. (Ladd 10)

The quest for Olympic gold has always included hard work, pain, and sweat, but wrestlers at Fox Catcher Farms, a world class wrestling training facility, in Pennsylvania are using silicon in the form of computer chips to help gain the upper hand (*Publish* p72). The Domination System, an interactive kiosk used by the United States wrestling team, helps wrestlers learn about more about themselves and foes they might face in future matches. The system, consisting of a computer, laserdisc player, and videotape player. uses a database to search 350 hours of video tape and show athletes

> ...their own or opponents' performances over a given time period, review the action at key matches, or make a survey of how different champions approach the same move. Wrestlers can also call up athlete biographies as well as detailed match statistics and, if they like, record selected video clips on tape for later perusal. (Guglielmo 73)

ENTERTAINMENT

> Settled in front of the computer, you click the mouse and a 12-second video tour of a Detroit high school commences, complete with voice-over. Click on a byline and the writer's photo appears on the screen. Click on a poem called "Wardance" and background music fills the room, drums adding resonance to the words. You realize that this is not a typical computer program. This is *HiWavz*, an interactive multimedia magazine conceived by PBS and Boston public television station WGBH, and written and illustrated by high-school students across the country. (Manly 48)

HiWavz is not the only interactive magazine out there. In a cross of sales kiosk and monthly magazine, *American Artist Interactive Magazine* is distributed to various locations throughout the country. Usually located in an art supply store *American Artist Interactive Magazine* gives customers and employees the opportunity to learn techniques from some of the leading artists around the world (American Artist 27).

Probably the most well known uses of interactive technologies is in the video game industry. Ever since the introduction of Pong in the 1970's, video game developers have been striving for a more and more realistic environment. Virtual reality uses the power of modern computers along with goggles, earphones, and even touch sensitive gloves and body suits to simulate whole experiences. Three dimensional goggles provide vision and when linked to the computer with position sensing devices will track the users head and eye movements changing the view on the screen to match the movements. Earphones provide directional sound, left, right, front, back, far, near. Gloves that are able to send the computer their

position provide users to reach out and pick up computer generated items such as boxes and cups. In the near future gloves as well as full body suits will include tiny bladders that can fill up providing pressure feedback. The harder the user squeezes on an object, the more the bladders will fill up. Users will be able to go anywhere, experience anything, even things that don't exist, and never leave their homes.

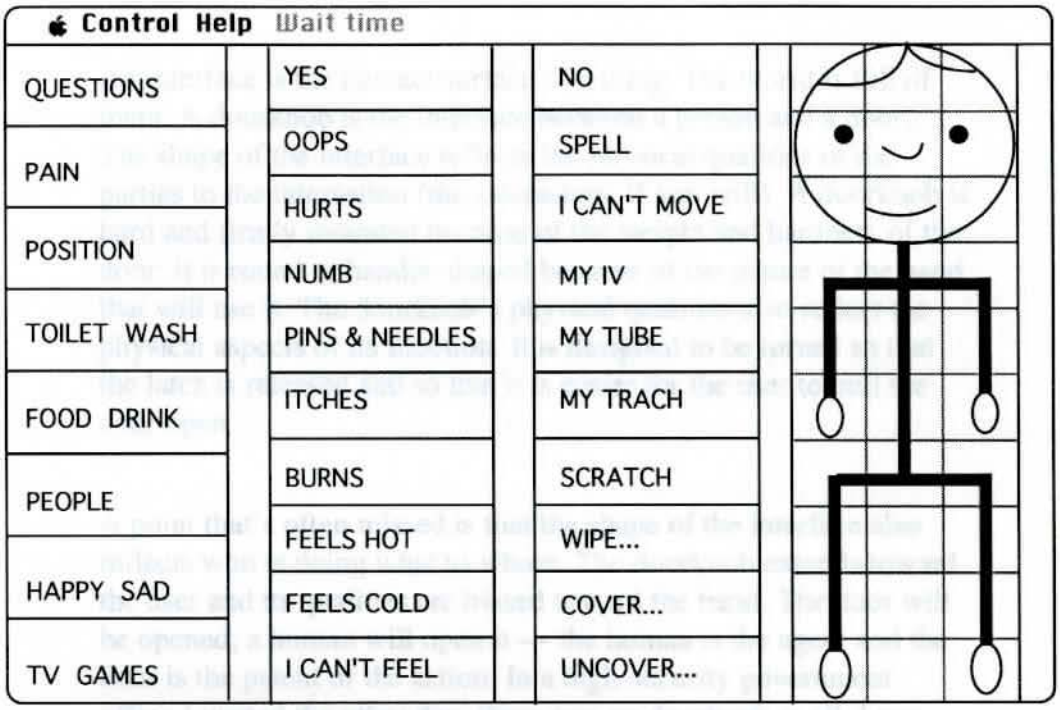
MISCELLANEOUS

Some people have developed uses of interactive technologies that don't fit quite so easily into categories, but looking into the more creative uses helps grasp the true power of this medium.

Hallucination and Deep Contact are pieces of interactive art Hallucination works by hooking a computer, video camera and VCR to provide the illusion that museum visitors that stand in front of the camera are on fire. Deep Contact is an interactive sexual fantasy that users control (O'Connor 16C).

My Voice uses interactive multimedia to help children in hospitals communicate when they might not be able to in the normal way. With the computer sitting at the foot of the bed, users direct the pointer with a track ball to the words or ideas they want to express (Daly 33). (Figure 8)

Figure 8
Screen from My Voice



Source: (Daly 33)

Design of Documents

History shows that making an item more powerful usually makes it more complex. The first video tape recorders were pretty straight forward, insert a tape and press the play or record buttons. Enter an inventor who sat down and said, "I bet if I hooked this thing up to a timer, and people could set it to record television shows when they're not home or in bed, it would be a lot more powerful." Sure the machine is now more powerful, but at the expense of simplicity. Because of the added complexity the additional power sometimes goes unused. As proof, consider the number of flashing 12:00s on VCR clocks around the country.

The key then to harnessing the tremendous power available with todays computers is sound planning and design.

Brenda Laurel presents a good broad definition of interface in her book The art of human-computer interface design:

> An interface is the contact surface of a thing. The world is full of them. A doorknob is the interface between a person and a door... The shape of the interface reflects the physical qualities of the parties to the interaction (the interactors, if you will). A doorknob is hard and firmly mounted because of the weight and hardness of the door; it is round or handle-shaped because of the nature of the hand that will use it. The doorknob's physical qualities also reflect the physical aspects of its function. It is designed to be turned so that the latch is released and so that it is easier for the user to pull the door open.
>
> A point that's often missed is that the shape of the interface also reflects who is doing what to whom. The doorknob extends toward the user and its qualities are biased toward the hand. The door will be opened; a human will open it — the human is the agent and the door is the patent of the action. In a high-security government office I visited the other day, there was no doorknob at all. I was screened by a hidden camera and the door opened for me when I passed muster. My sense of who was in control of the interaction was quite different from the way I feel when I enter a room in my house. In the office, the door, representing the institution to which it was a portal-was in control.
>
> An interface is a contact surface. It reflects the physical properties of the interactors, the functions to be performed, and the balance of power and control. (Laurel pxii)

No where else is interface more important than in interactive uses. Users of a word processing application, while not relishing it, do have the opportunity to dig through a manual in order to learn the intricacies of a program. The shopper using an interactive kiosk in a mall must know almost intuitively how to find a particular shoe store. If the kiosk is not simple to use the shopper will likely continue walking to find the store. All the fancy video, menus, and sounds will remain entrapped, waiting for someone with enough time to figure out how to release them.

Design in Computer Games

Computer games suffer from the fact that they are primarily used for entertainment. There are no documented cases of anyone being forced to score 1,000,000 points on Space Invaders at the next board meeting in order to keep their job. Because of this fact, game programmers have been forced to design interfaces that are easy to use, providing valuable lessons when tackling more noble tasks. Joysticks and trackballs were all widely accepted in video games before making the jump to serious computing (Crawford, Laurel 103). In addition to hardware innovations, vast strides in interface design have been seen in the computer game industry.

Crawford points out:

> The user of a game feels no compulsion to play the game. If the game's interface is clumsy or confusing, the player simply abandons it. Thus, a game's user interface must pass not a relative test but an absolute test, and a harsh one it is. The user interface must be not merely functional, nor even just easy to use-it must also be fun! (Crawford, Laurel 103)

The same can be said for stand alone kiosks or interactive advertising bound in a magazine. In order for designers to provide this functional, easy, and fun interface, Crawford offers a few suggestions:

> • Recognize and use the different strengths of various input devices. Many beginning shop students are told never to use the handle of a screwdriver to pound in a nail. The same can be said of input devices, you can use a keyboard to select text and move the pointer around the screen, but why when the mouse does a much better job. This rule pertains to the use of graphics and text. If the designer can show it, he should show it.

> • When possible design for the type of computer the application is going to be run on. Game designers have learned programs that tax a computer processor too much creating delays in the action cause users to loose concentration and interest. The computer should wait for instructions from the user, not the other way around. (Crawford, Laural, 104)

PITFALLS

Theodor Nelson, coiner of the terms hypertext and hypermedia, is an outspoken critic of how current computer interfaces are designed. Nelson states the existence of user manuals, help screens, and telephone support is plenty of proof that interface design is not doing its job. Nelson's elements of bad design include "Featuritis" where a piece of software attempts to do so much that it almost becomes unusable (Laurel p 236).

USER TESTING

Don Norman, chair of the Department of Cognitive Science at the University of California at San Diego, is a leading advocate of prioritizing activities at the beginning of a design project. Norman believes that the first thing hashed out should be how the software is going to be used. Only then should the interface be considered. As an example of this, Norman uses a project that IBM worked on to provide a message system for athletes participating in the 1984 Olympics. Prior to designing the "guts" of the system IBM employees considered that the users would most likely have little technical knowledge, speak a number of different languages, and all be in a hurry. To study how the units would be used they constructed cardboard mock-ups, and set them up in the IBM research facilities. The designers then invited people in to use the system and studied their actions.

After a design was settled on, prototypes were built and installed at track meets to be studied further. IBM ended up with a very successful system that handled many thousands of messages during the games, a testament to good design study throughout a project (Rheingold, Laurel 9).

In the previous example testing played a major role in every step of the development process, but the testing was not done within the sanitary walls of the IBM labs, it was done with the kind of people who would eventually be using the system. Norman points to some important reasons for this:

> Designers may think of themselves as typical users, and maybe they were before they started, but after they have thought about the task for as long as you need to for proper design, they are no longer typical, they can no longer understand the average user: they know too much.
>
> Designers are confident. Users, however, are often fearful. Fear is an important element in every novice computer user's first attempts to use a new machine, or new software: fear of destroying data, fear of hurting the machine, fear of seeming stupid in comparison to other users, or even to the machine itself. (Rheingold, Laurel 10)

Kathlen Gomoll, a designer for Apple computer shares Don Norman's enthusiasm for early user testing of new software. When designing the on-line help system for Apple's Macintosh computer, Gomoll's group watched people using the Macintosh. After the sessions the group sat down and studied the questions the users had and built the help system around the analysis. In order for other designers to use this technique Gomoll offers advice on how to set up user observations:

User Testing Steps

1. Set up the observation

Write the tasks. To prepare for a user observation, you'll want to design some tasks for a user to work through with your product. These tasks should be real tasks that you expect most users will do when they use your product. Design tasks that focus on the part of the product you're studying.

Recruit the users. When you look for users, try to find people who have the same experience level as the typical user for your product. Be careful not to recruit people who are familiar with your product or your opinions about the product.

Set up a realistic situation. An ideal setting for user observation is a quiet, enclosed room with a desk. Create an environment that is natural but free from interruption by getting users away from phone calls and other distractions.

2. Describe the purpose of the observation (In general terms)

Set the user at ease by stressing that you're involving them in your design process. Emphasize that you're testing the product, not the users. For example, you could say:

- You're helping me by trying out this product in it's early stages.
- I'm testing the product, I'm not testing you.
- I'm looking for places where the product may be difficult to use.

3. Tell the user that it's OK to quit at any time.

Make sure you inform users that they can quit at any time if they find themselves becoming uncomfortable. This is not only an ethical observation technique, it's standard professional practice. Users shouldn't feel as if they're locked into completing tasks.

4. Talk about and demonstrate the equipment in the room

Explain the purpose of each piece of equipment and how it will be used in the observation... If you're using a computer, determine the user's previous experience with keyboards, computers, this computer, similar software, etc. Demonstrate the use of any equipment that users will need in order to complete the tasks.

5. Explain how to "think aloud."

Ask users to think aloud during the observation, saying what comes to mind as they work. By listening to users think and plan, you'll be able to examine their expectations for your product, as well as their intentions and their problem-solving strategies. You'll find that listening to users as they work provides you with an enormous amount of useful information that you can get in no other way.

Unfortunately, most people feel awkward or self-conscious about thinking aloud. Explain why you want them to think aloud, and demonstrate how to do it.

6. Explain that you will not provide help

It is important that you allow users to work with your product without interference or extra help. This is the best way to see how people really interact with the product. For example, if you see a user begin to have difficulty and you immediately provide an answer, you will lose the most valuable information you can gain from user observation-where users have trouble, and how they figure out what to do.

Of course, there may be situations in which you will have to step in and provide assistance, but you should decide what those situations will be before you begin observing. For example, you may decide that you will allow someone to flounder for at least three minutes before you provide assistance. Or you may decide that there is a distinct set of problems for which you will provide help.

As a rule, try not to give your users any more information than the true users of your product will have.

7. Describe the tasks and introduce the product

- Explain what the participant should do first, second, third...
- Give the participant written instructions for the tasks.
- Describe the general function of the product.

8. Ask if there any questions before you start; then begin the observation

9. Conclude the observation

When the observation is over:

- Explain what you were trying to find out during the observation.
- Answer any remaining questions the participant may have.
- Discuss any interesting behaviors you would like the participant to explain.
- Ask the user about their overall impressions, as well as any details they would like to discuss.

10. Use the results

As you observe, you will see users doing things you never expected them to do. When you see users having difficulty, your first instinct may be to blame the difficulties on the user's inexperience or lack of intelligence. But the purpose of observing users is to see what parts of your product might be difficult or ineffective. Therefore, if you see a participant having difficulty or making mistakes, you should take note and attribute the difficulties to faulty design, not to the participant.

It's a good idea to keep a record of what you found out during the observation. That way, you'll have documentation to support your design decisions, you'll be able to see trends in users' behavior, and you'll be able to tell others how real users helped you to design your product. After you've examined the results and summarized the important findings, fix the problems you've found and have users try it out again. By involving users more that once, you'll see how your changes affect their performance. (Gomoll, Laurel 85)

ELECTRONIC VS. PAPER

A basic decision made by most people who disseminate information involves, how the information should be dispersed. The solution is usually based upon the abilities of particular media compared to the needs of the project. Today's emerging interactive technologies offer a wide range of abilities. Multimedia can combine video, computer animation, and sound into a package that can be referenced in a manner similar to reading a book. So far, the majority of electronic publishers have used interactive documents as kind of "souped up" paper documents. As always, there are pros and cons when considering electronic publishing vs. paper publishing.

The most notable negative aspect to electronic publishing is access. A person can't use a hyperdocument without a computer, but even this is changing. Laptop computers are in a constant spiral downward in terms of price, size, and weight giving people the ability to view electronic documents in places other than sitting at a desk.

Figure 9
Benefits of Hyperdocuments

The reader can follow hyperlinks at high speed

He can link:

- to more detailed explanations
- to pictures
- from parts of pictures to explanatory text
- to reference information
- to a glossary
- to video

The document can have complex and interesting structures

- The document could be structured around diagrams, the reader having the ability to link from the diagram structure to the text
- The reader can navigate logically (as opposed to physically) around the document, at high speed
- The reader can very rapidly expand and contract areas of the document

The document can have intelligence built into it

When a hyperlink is followed:

- computations may be performed
- the document may ask the user questions

The document may have an expert system built into it, for example a maintenance manual may give help in diagnosing machine problems.

The document may help to solve user problems, for example by relating issues to their passible solutions.

The document may adapt itself to the reader.

The document can indicate what the reader has already looked at.

The computer can know the readers skills.

The reader can mark whether he likes what he has read.

The document can adapt itself to the likes and skills of the reader.

Brute-force searching can be used.

The computer can find every occurrence of a search word or phrase, possibly skipping at the user's request from one occurrence to the next.

The computer can replace every occurrence of a word with a different word.

Source: (Excerpts from Martin 14-15)

Figure 10
Benefits of Hyperdocuments (continued)

Documents of vast size can be used.
The document may be on a CD-ROM.

Documents can be designed for ease of updating.
With large paper documents, updates sent out periodically are often not inserted as they should be; to do so is tedious work. With electronic documents the updates do not have to be inserted by the user. They can be distributed electronically, or new disks sent out periodically.

Documents can be linked.
Documents may have references to one another which can be automatically followed by the reader.
Multiple documents may have hyperlinks to:

- a common glossary
- common diagrams
- common sets of concepts
- common nuggets of information

Portions of documents can be hidden for security reasons.
Locked segments of the document may be unlockable on a "need to know" basis.

Portions of the documents can be hidden to avoid bewildering the reader.
As the reader scans the document he may prune it, for his purposes, by making certain segments invisible.

Source: (Excerpts from Martin 14-15)

CHAPTER THREE
SELECTIVE REVIEW AND EVALUATION OF RESEARCH

Plan of Action

While making the decision to use an electronic document to recruit potential students is a start, there are still a lot of questions that need to be answered prior to actually starting to design the project. All of these decisions will set up parameters for the project and are interdependent, changing one might very well effect others.

The first decision that must be made is how the project is going to be delivered. At this time, the two methods of delivery for multimedia programs are playback on a specific "dedicated" computer such as the point of sale kiosks discussed in chapter two, and mass distribution to individuals who then play back the production on their computers.

From a strictly design standpoint, developing programs to run on a dedicated kiosk is the most attractive alternative. Programs can be created to take advantage of hardware strengths and avoid, or play down weaknesses. Negatives include the cost of purchasing a system that may only be used for this purpose. Viewership is decreased significantly also since users must come to a specific machine to view the program. For some applications this isn't a problem. The Ben & Jerry's production was intended to be seen only by visitors to the Ben & Jerry's Vermont factory. When producing a project for a dedicated kiosk designers can outline what they want and then specify hardware that will enable them to implement the program.

The purpose of this project is to create an electronic version of the Lindenwood College catalog that can be distributed to prospective students. While a dedicated kiosk could be designed and transported by admissions staff to area high schools and college fairs, a program designed for wide distribution and playback on students computers will reach a significantly greater audience.

When designing a production that will be distributed widely and played back on various computers, the designer must answer several fundamental questions prior to designing the project. Some of these questions include:

- Playback platform
- Distribution media
- Goals of the production
- System requirements

Probably the most fundamental question is, what platform will the student be using to view the program. This is a choice between and IBM compatible computer or PC, and the Apple Macintosh or Mac.

Once the playback platform has been chosen, the next question that needs to be answered it what media will be used to distribute the program. There exist many kinds of storage media for computers in a variety of sizes. (Table 1)

Table 1
Types of storage

	Floppy Disk	**SyQuest**	**Bernoulli**	**CD-ROM**
Storage Size	1.4 MB	44-144 MB	44-144 MB	650 MB
Access Speed	Slow	Fast	Fast	Medium
Cost of drive	Built in	Medium	High	Medium
Cost of media per MB	High	High	High	Low
Availability	High	Medium	Medium	Low

The media capable of storing the most data is the CD-ROM or compact disk-read only memory. The usual procedure for publishing a CD-ROM is to gather all the material and send it off to a CD pressing plant. The pressing plant will produce a master disk that costs around $2000 and for mass distribution, and create as many copies as needed at around $2 per disk. For projects that don't require a large amount of copies, desktop CD-ROM recorders are now available for around $6000. A CD-ROM requires a CD-ROM drive to play and while the number of installed CD-ROM drives is expanding every day, they remain a luxury for most computer owners. CD-ROMs are capable of storing an incredible amount of data over 600 megabytes enough for any multimedia producer to go wild with animation, sound and video clips. The Voyager Company has even produced "A Hard Day's Night" An electronic version of the of the Beatle's movie of the same title. The disk contains the entire movie along with annotations.

Several types of removable storage that hold from 44-88 megabytes exist such as SyQuest and Bernoulli drives, but the lack of installed drives, and high cost of media remove them as serious contenders for storage of widely distributed multimedia projects.

The most versatile storage media for computers remains the floppy disk. Every computer sold for the last 10 years has some kind of floppy drive. The Macintosh has standardized on the 3.5 inch floppy drive since it was developed in 1984. IBM compatibles have a 5.25 inch, a 3.5 inch floppy drive, or both. The 5.25 inch drives are slowly being phased out. Depending on the authoring software, almost everyone with access to a computer will be able to view a production distributed on floppy disk. The largest negative concerning floppy disks is the relatively small amount of storage. High density disks can only store 1.8 megabytes. They are cost effective though. With a little time one can duplicate disks by themselves at around 80 cents per disk.

The actual production is created using software in what is called the environment. Several decisions must be made when choosing an environment.

In order to decide on software to develop the project the producer must know what roll the user will take. Will the user be a passive observer, or an active participant? If the user will be passive, just watching the presentation, several options exist.

Presentation programs exist to produce computer "slide shows" that include text, graphics, photographs, and even video clips. A step up from these software packages will let the developer incorporate animations, and sound.

If the project requires interaction with the user, software must be chosen that allows for interactivity. The first level of these programs add interactivity to slide presentations. Clicking a button takes the user to another "slide".

Authoring programs provide tools much more complex and powerful than interactive slide presentations. This power is usually accomplished through scripting. When scripting, the developer writes small programs to instruct the computer what to do in certain situations. Scripts in many programs are short English-like commands that can be set up to do things as a result of a variety of actions taken by the user. For example, if the user wants to quit the program, the developer may want him to view a screen prior to quieting. These screens might include the copywrite notice, credits, etc. Inside the program there would be a section with the title "exit sequence". A button on the screen labeled 'exit' or 'quit' would have a script attached to it that said:

```
on mouse up
go frame "exit sequence"
end mouse up.
```

Scripts can also tell the computer to advance to a specific place in the program, play a sound or video clip, access a data base, store information input by the user, or retrieve information from a CD-ROM or videodisc player.

In addition, most of the software used to produce the actual multimedia programs have limited or no way of creating the raw material or graphics used in the productions. Some of this additional software might include paint programs, image editing programs, and 3-D modeling programs.

Most environments provide what are called "run-time players". A run time player allows users who don't have the full authoring tool to run productions produced by the program. Some environments allow programs produced on the Macintosh to be played back on the Macintosh and on PCs. Another consideration is licensing. Some software publishers require designers to pay a licensing fee to use the run time player when distributing commercial titles. Other publishers let producers distribute programs royalty free.

Once it has been decided what platform the program will be designed for, how it will be distributed and what software environment will be used, it's time to start making decisions on what is referred to the minimum system requirements. Minimum system requirements define the minimum computer hardware and software needed to run the program. These minimums will dictate how the programs content is displayed.

One important consideration when developing multimedia for the Macintosh is wither or not it will require a color monitor. For many years the Mac was only available with a black and white, or monochrome, monitor. In fact Apple still sells a Macintosh without color capabilities and a significant number of Mac users have Macintoshes with monochrome monitors. One might ask why even consider monochrome when developing multimedia. The answer is storage space. The computer displays images on the monitor by dividing the screen into thousands of

tiny squares, each square is called a pixel. On a monochrome monitor images are formed by turning each pixel on, black, or off, white. By turning on the correct pixels the computer can draw squares, circles, and just about anything else. In order to store an image the computer stores it on a disk using a binary code. Black and white is easy to store. A pixel is either on (1), or off (0). The Macintosh screen has 72 pixels per inch, 5184 per square inch. To store an image on disk requires 5184 bits, one bit, on or off for each pixel. To represent color, the computer assigns additional bits to the code. In order to use 256 colors, the code for each pixel requires 8 bits. It looks nice, but simple math will show that a 256 color image takes up eight times the room as the same monochrome image. True color images on a computer require 32 bits per pixel, or 1,327,104 bits per square inch. Quite a lot to store but those different combinations yield 16.8 million colors.

System software controls the computer. It tells the computer where and when to store data, how to draw images on the screen, it directs communications between the computer, printers and other devices as well as many other tasks. As technology advances, computer companies are constantly making improvements in system software. While the companies make an effort to keep everything compatible, some software will not run on system software that is too old. For example, at this writing the most recent version of system software for the Macintosh is System 7.1. The run time player for Macromedia Director, an authoring environment for the Macintosh, will only run on system versions 6.7 or later. This is one of Director's minimum system requirements.

The brain of the computer is the central processing unit (CPU) or chip. CPUs differ in computational power. Usually the more expensive the chip the faster and more powerful it is. This can effect projects in a number of ways. By their very nature, most multimedia programs involve movement of some kind, animation,

quickly changing screens, video clips etc. The computer displays motion the same way television and movies do, by showing a string of still images fast enough to produce the illusion of movement. In order to do this, the chip has to compute and update, or redraw the monitor screen very quickly. Some of the factors that effect how fast still images can be shown include, the screen size, the color depth, and the CPUs speed. Bigger screens mean more pixels to figure out, on, off, what color. Color depth refers to how many colors can be displayed at one time 8 bit, 256 colors, 16 bit 32,000 colors, 32 bit 16,8000,000 colors. A slower chip just won't be able to compute the placement and colors of some productions quickly enough resulting in slow jerky playback. Time and progress also make CPU's obsolete. Some newer programs require more powerful CPU's to run.

As mentioned above, if the program will be distributed on CD-ROM, users must have a CD-ROM drive. Some older machines are also not able to read high density floppy disks, but that is a small minority of the computers in use today.

More Traditional Approachs

In chapter one, college recruiting materials such as viewbooks and brochures were discussed. The aim of this project is to propose a newer, if not better way of delivering the information provided by the more traditional means. In order to get a better grasp of what type of information colleges are putting into their recruiting materials a review was done at a local college fair in August, 1993. Viewbooks and brochures were collected from eighteen private and public colleges and universities throughout the mid-west. The materials were analyzed to decide what information these institutions thought important to get out. Materials were collected from:

Bradley University - Peoria, IL

DePaw University - Greencastle, IN

Drake University - Des Moines, IA

Drury College - Springfield, MO

Hannibal–LaGrange College, Hannibal, MO

Illinois Wesleyan University - Bloomington, IL

Knox College - Galesburg, IL

Lincoln College - Lincoln, IL

Northeast Missouri State University - Kirksville, MO

Northwest Missouri State University - Marryville, MO

Quincy University - Quincy, IL

St. Ambrose College - Davenport, IA

Southeast Missouri State University - Cape Grardeau, MO

Southweast Missouri State University - Springfield, MO

University of Missouri, Rolla - Rolla, MO

University of Missouri, St. Louis - St. Louis, MO

Westminster College - Fulton, MO

William Jewell College - Liberty, MO

Tabel 2
Recruiting materials survey

	Yes	No
Class Information	14	4
National rankings i.e., Money magazine	3	15
Number of students	4	14
Average class size	2	16
Student diversity	4	14
Computer in dorm room	2	14
Accreditation	3	15
Cost	12	6
EEOC notice	2	16
Full Application included	7	7
More information card	12	6
City information	2	16
Miles from map	4	14
Athletics	5	13
Scholarship/Financial Aid	12	6
Student/Faculty profiles	4	14
Student/Faculty quotes	8	10

In addition 20 families were interviewed at random about their child's college search. Questions asked were:

What year is the college bound student?

Freshman: 1

Sophomore: 1

Junior: 2

Senior: 16

Are you receiving the materials you need to make an informed choice?

Yes: 17

Would like to know more about cost: 1

No, but don't know what else would be needed: 1

Are you likely to make a campus visit based solely on recruiting materials?

Yes: 14

No: 3

Based on word of mouth: 1

Father is alum: 1

Visit with campus recruiter: 1

Are you more likely to consider attending an institution based only on recruiting materials?

Yes: 12

No: 8

When academic offerings do you like the short descriptions or long detailed descriptions ?

Short: 19

Long: 1

Do you find information on the extra curricular activities valuable?

Yes: 10

Would like more: 3

Would like information on neighborhoods around campus: 2

Would like information on campus safety: 5

Chapter Four
Results

Road to a Finished Project

As mentioned at the start of the previous chapter, making the decision to create a multimedia production is just the start of a long list of decisions that need to be made. This project was no different.

At the time the electronic catalog was first considered, there were no authoring programs available to the average user on the PC compatible platform, so the first decision as far as delivery method was made almost by default.

While the installed base of Macintosh computers is significantly smaller at this time, Apple continues to have a strong presence in the schools. It was judged that even though a potential student might not have access to a Macintosh at home, there was a strong possibility that the student would be able to view an electronic catalog at school.

Once the decision was made to produce the project on the Macintosh platform, it was time to decide on an authoring environment. At the time of the catalog project, three major environments existed, HyperCard from Claris Corporation, SuperCard from Silicon Beach Software, and Director published by Macromind. The first version of the catalog was produced using HyperCard. HyperCard, as discussed earlier, is used extensively in schools and seemed a logical way to distribute the electronic catalog. Some form of HyperCard is included with every Macintosh sold so a run time player was not needed. SuperCard did not include a run time version meaning it required the full application to be installed on the Macintosh or the student receiving the catalog would not be able to view it. There was no access to Director at the time.

After a review of marketing materials produced by Lindenwood and other area institutions, it was decided that the catalog would include information on the

history of Lindenwood College, course offerings at Lindenwood, information about the area, and some kind of request for more information. Following the completion of a prototype catalog, the computer science department obtained a copy of Macromind Director. After some experimentation with the new software, a decision was made to switch authoring environments to Director. This decision was made for three main reasons.

Macromind published a piece of software titled *Director Player for Windows*. With the Windows player, Director movies can be developed on the Macintosh and then ported to run on any IBM compatible computer running Microsoft Windows 3.1. The advantage of this is obvious. As discussed earlier, one of the drawbacks to developing on the Macintosh is the relative lack of machines. The player for Windows removes this negative.

The other reasons for choosing Director were the ability to add color to productions, and the fact that Director includes a run time version or player that makes it possible to distribute copies of productions to computers without the Director program. HyperCard only supports black and white and does not include a player.

After choosing to produce the disk on the Macintosh using Director, it was decided to use the lowest common denominator as the minimum system requirements. By doing so the disk will be compatible with most Macintosh computers. These system requirements are:

System 6.0.8 or higher,

An Apple Super Drive Floppy disk drive,

A 12 inch Color Monitor,

The only bells and whistles the Catalog on Disk requires is a color monitor. As mentioned in chapter three, there are still a significant number of Macintosh computers in use with black and white screens. It was decided not to support these machines for two reasons:

Since this piece is designed to spark an interest that leads to additional inquires to Lindenwood for information, color was essential.

Many schools are moving from black and white Macintosh machines to color.

The Catalog on Disk is based on a 12 inch screen since that was the smallest color monitor Apple produced at the time minimum system requirements were written up. Apple now manufactures a 9 inch color monitor. Playing the Catalog on Disk on a smaller will result in the screen image being cropped

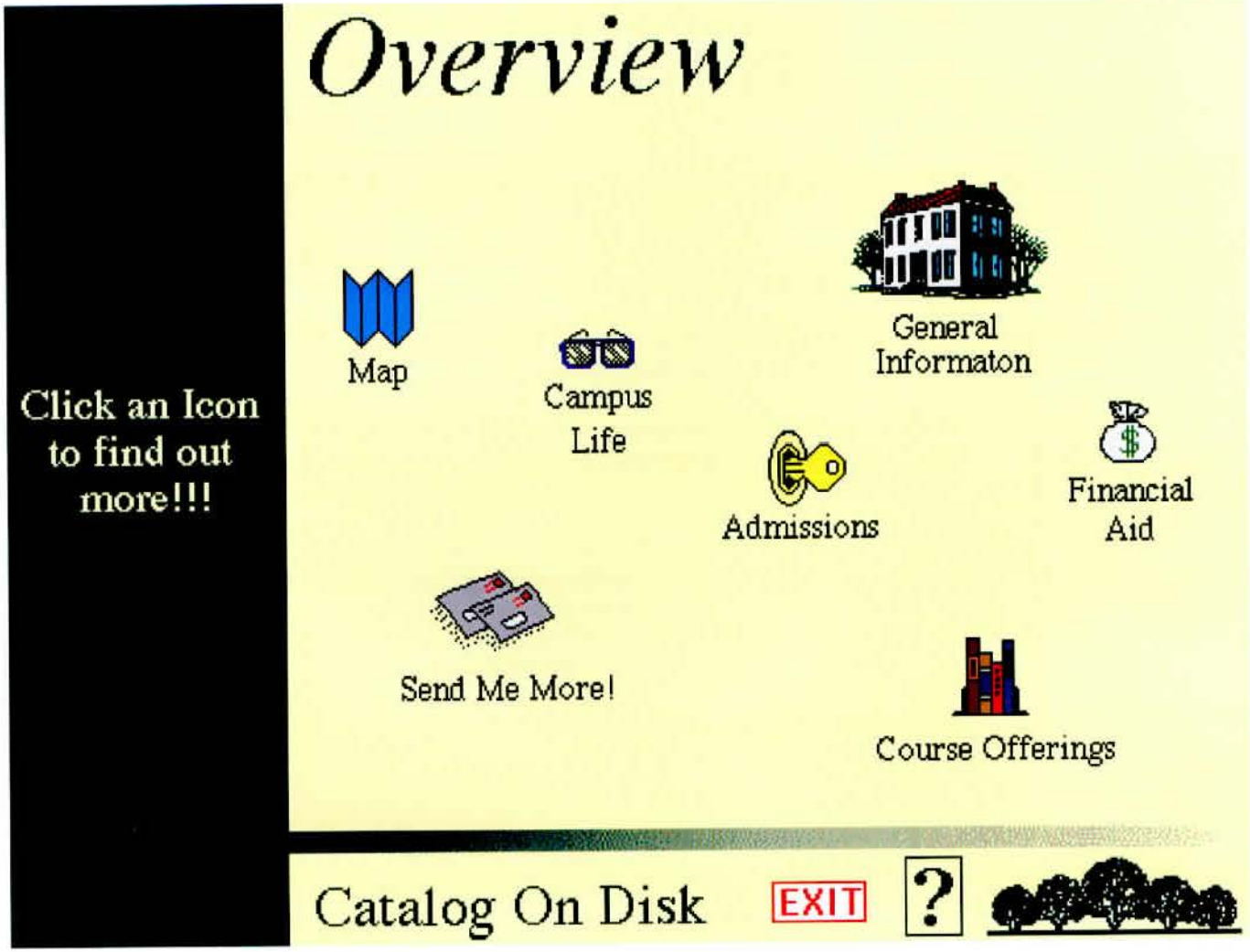
The Catalog On Disk

The following pages contain print outs of selected screens from the Lindenwood College Catalog on Disk.

Welcome to the

LINDENWOOD COLLEGE

Catalog On Disk


Overview
Click an Icon to find out more!!!
Map
Campus Life
General Informaton
Admissions
Financial Aid
Send Me More!
Course Offerings
Catalog On Disk
EXIT
?

Purpose of the College

The purpose of Lindenwood College is to provide:

Higher education committed to the College's Judeao-Christian heritage, life-long learning and service to the community.

A career-oriented environment that equips student to confront the challenges and seize the opportunities of the future for an involved, responsible life.

A values-centered community that fosters dignity and positive self-concepts of individuals as they pursue educational, spiritual and personal objectives in an academic setting for the development of leadership, social skills, physical well-being, ethical values, and greater knowledge and understanding of humanity.

Catalog On Disk EXIT ?

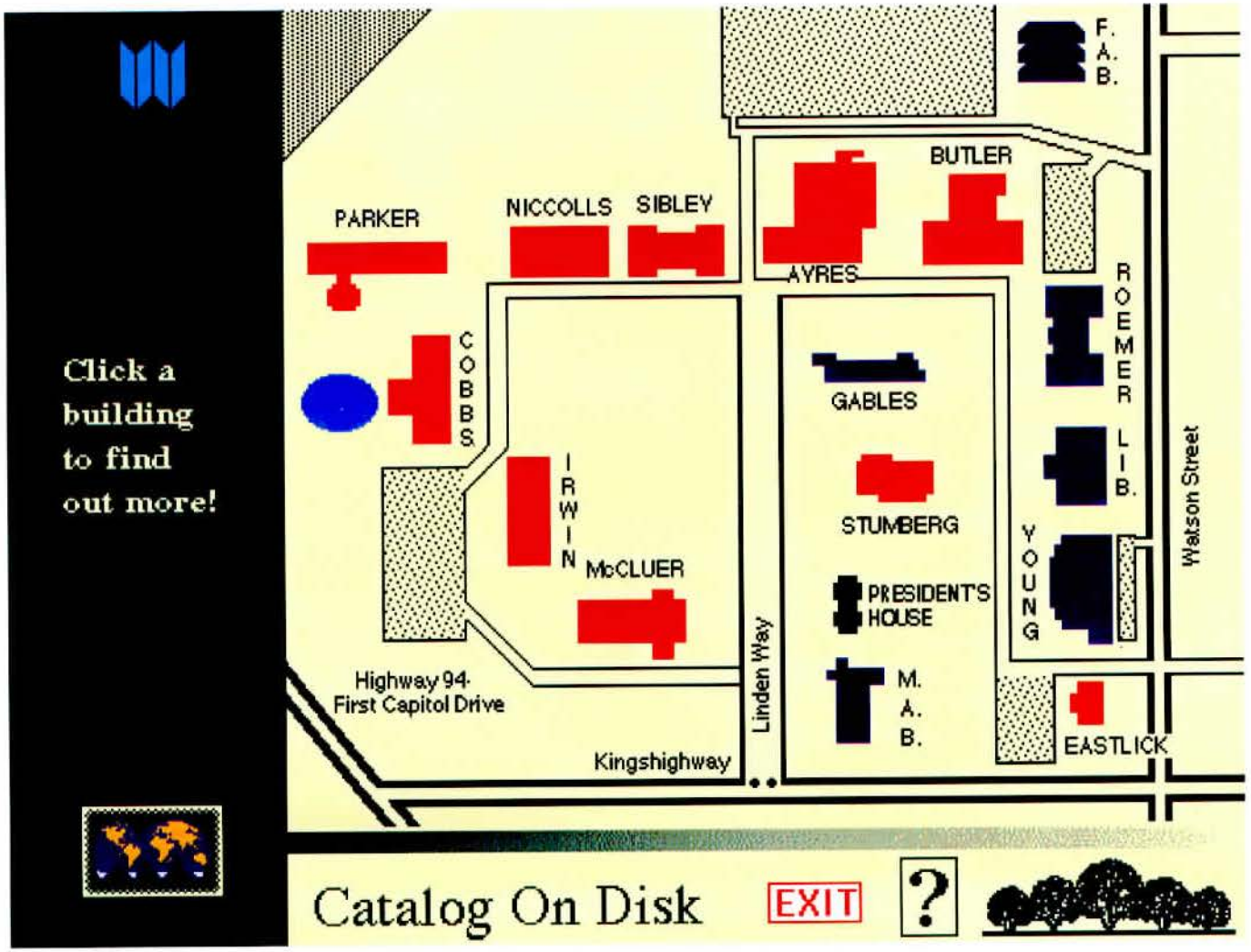
St. Charles

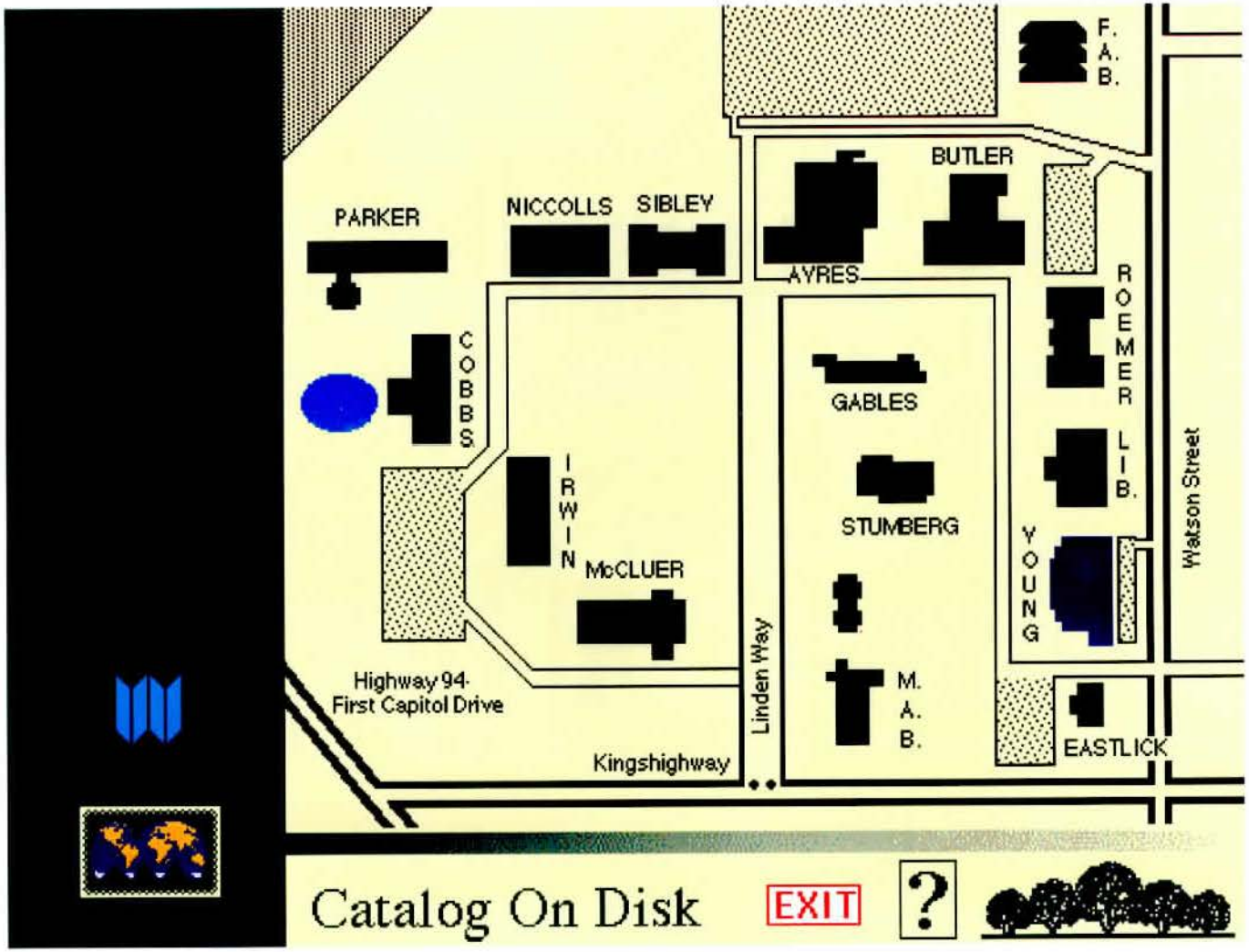
As a student at Lindenwood, you will be exploring and discovering many new and exciting areas. You won't be alone in these adventures though., people have been using St. Charles as a launching pad for discovery since 1769. Founded by French-Canadian fur trader Louis Blanchette, St. Charles has served as the starting point for Lewis and Clark and the Zebulon Pike Expedition. For thousands of pioneers, St. Charles was the "Last food and lodging" available on their long westward journey. Missouri started its history as a state with a capitol in St. Charles.

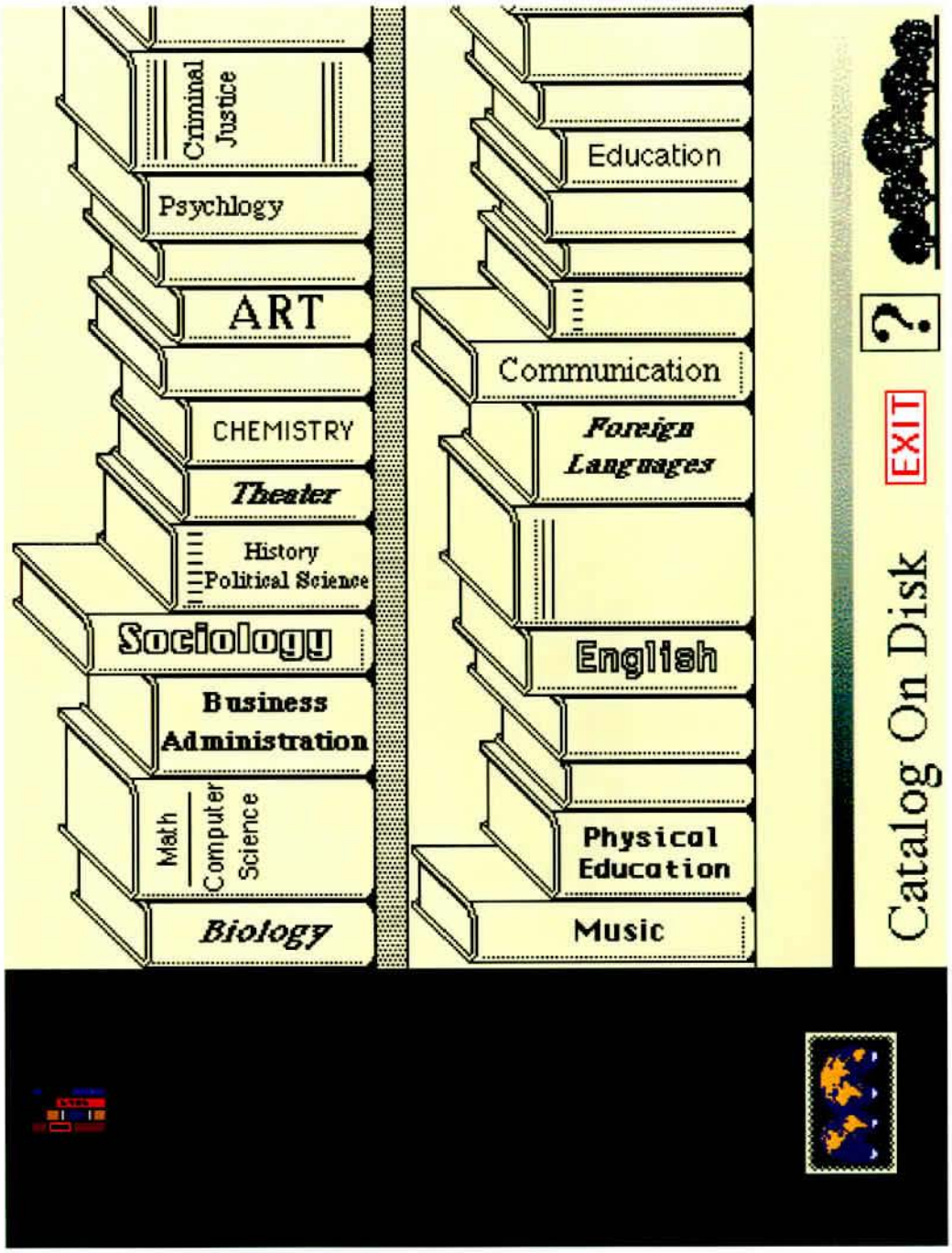
Today, the St. Charles area is an exciting mix of old and new. You can shop along historic Main Street, with its buildings dating back to the 1700's or drive a few miles and enjoy all the amenities of Mid-Rivers Mall with its three anchor department stores.

The Main Street area serves as host to a number of special events and festivities throughout the year. In May, the Lewis and Clark Rendezvous features a recreation of the encampment used just prior to the expedition of newly purchased Louisiana Territory. July brings fireworks, rides, and crafts to the river front with Riverfest. More than 300,000 people annually experiencing Festival of the Little Hills in August. Oktoberfest, well that speaks for itself. And to make a truly memorable holiday season, Christmas Traditions runs weekends from Thanksgiving to Christmas.

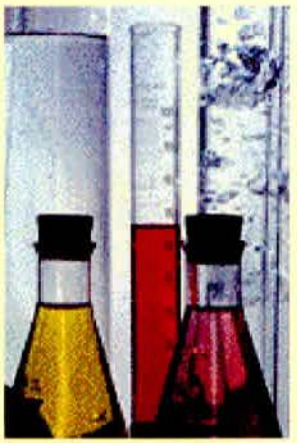
Catalog On Disk EXIT ?


Click a building to find out more!
F. A. B.
BUTLER
PARKER
NICCOLLS
SIBLEY
AYRES
ROEMER LIB.
COBBS
GABLES
IRWIN
STUMBERG
McCLUER
YOUNG
Watson Street
PRESIDENT'S HOUSE
Highway 94 · First Capitol Drive
Linden Way
M. A. B.
EASTLICK
Kingshighway
Catalog On Disk
EXIT
?


F.
A.
B.
BUTLER
PARKER
NICCOLLS
SIBLEY
AYRES
ROEMER LIB.
COBBS
GABLES
IRWIN
STUMBERG
McCLUER
YOUNG
Watson Street
Linden Way
Highway 94
First Capitol Drive
M.
A.
B.
EASTLICK
Kingshighway
Catalog On Disk
EXIT
?


Criminal Justice
Psychlogy
ART
CHEMISTRY
Theater
History
Political Science
Sociology
Business Administration
Math
Computer Science
Biology
Education
Communication
Foreign Languages
English
Physical Education
Music
Catalog On Disk
EXIT
?

Chemistry



The Chemistry Department offers a Bachelor of Arts degree. This degree may be used as a pre-med program Students wanting to minor in Chemistry should contact the department.

Catalog On Disk EXIT ?

Send Me More!!

For more information about the exciting educational opportunities at Lindenwood College, fill out this form, print it and mail it in. To advance to the next box use the "TAB" key.

Name:

Address:

City: State: Zip:

Phone:

Catalog On Disk EXIT

Tell us about you!!

High School: _____

Graduation Date: _____ GPA: _____

Academic/Major Interest: _____

Would you like to set up an appointment if an admissions officer visits your high school?

○ Yes!! ○ Not at this time.

Would you like to schedule a campus visit?

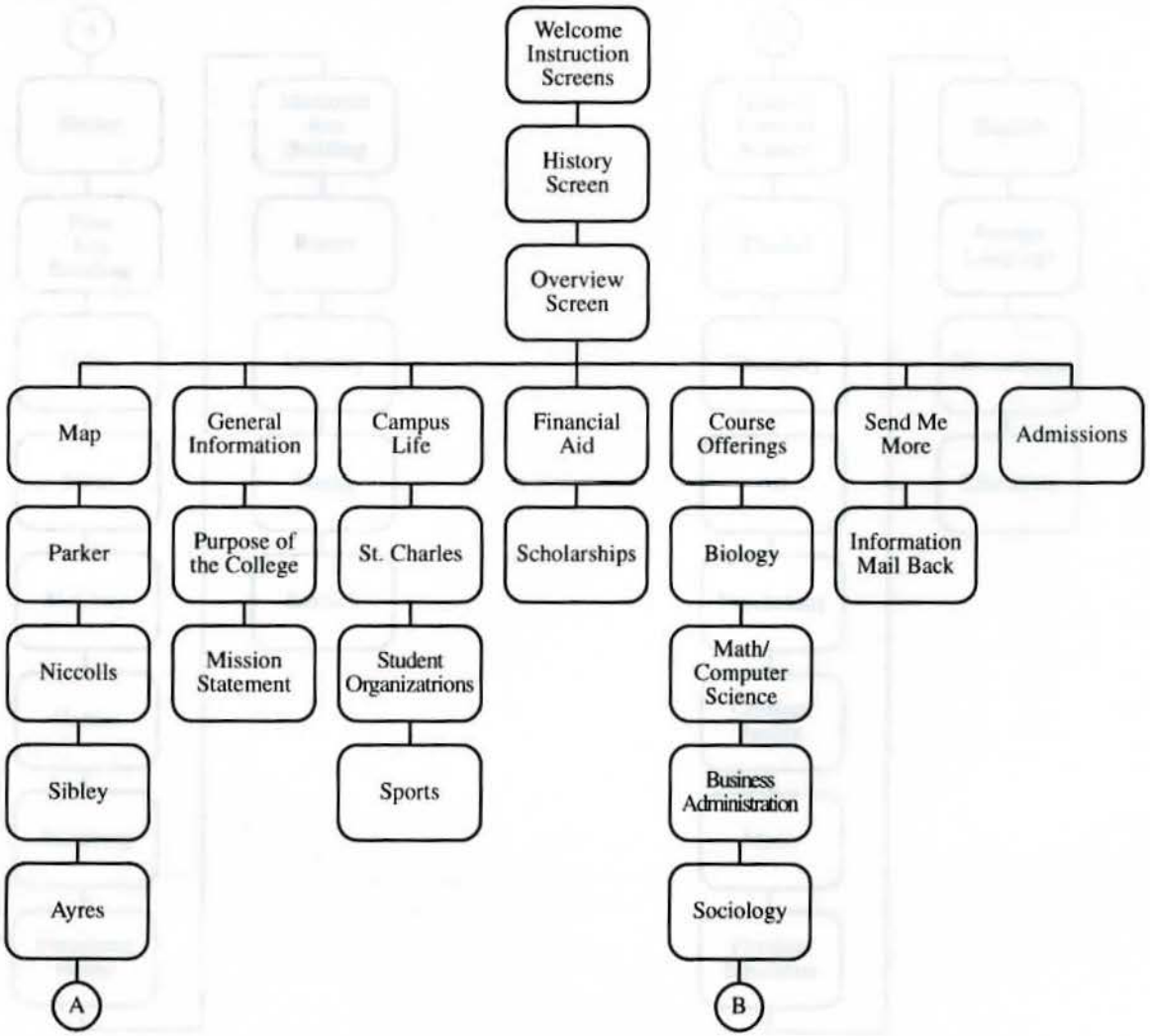
○ Yes!! ○ Not at this time.

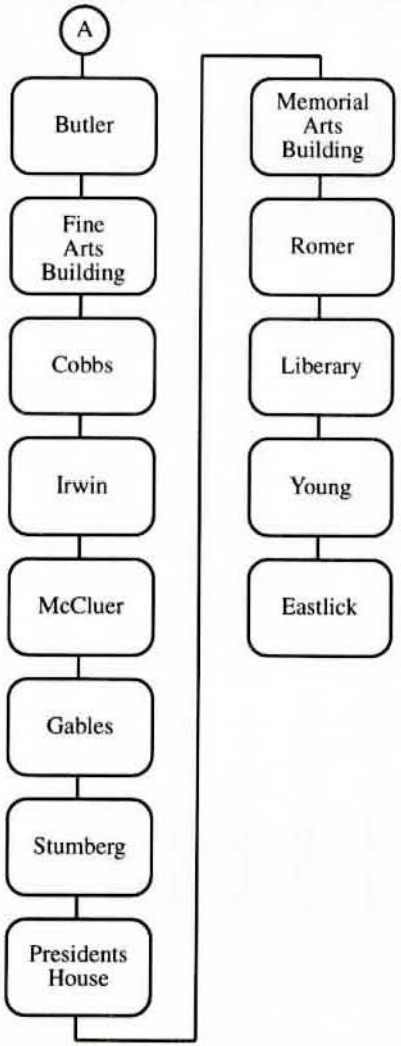
When finished filling out this information, mail these two pages to:

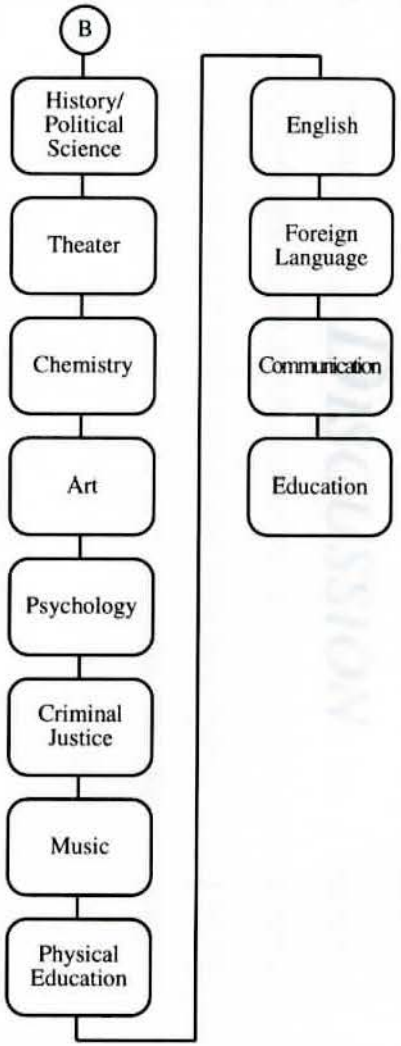
Office of Undergreduate Admissions
Lindenwood College
209 South Kingshighway
St. Charles, MO 63301-1695

PRINT

Catalog On Disk EXIT


Welcome Instruction Screens
History Screen
Overview Screen
Map
General Information
Campus Life
Financial Aid
Course Offerings
Send Me More
Admissions
Parker
Purpose of the College
St. Charles
Scholarships
Biology
Information Mail Back
Niccolls
Mission Statement
Student Organizatrions
Math/ Computer Science
Sibley
Sports
Business Administration
Ayres
Sociology
A
B


A
Butler
Fine Arts Building
Cobbs
Irwin
McCluer
Gables
Stumberg
Presidents House
Memorial Arts Building
Romer
Liberary
Young
Eastlick


B
History/ Political Science
Theater
Chemistry
Art
Psychology
Criminal Justice
Music
Physical Education
English
Foreign Language
Communication
Education

Chapter Five
Discussion

The Professionals Prospective

The complete Catalog on Disk was reviewed by Mr. Dan Polacek, a guidance counselor at Parkway West Senior High School. Mr. Polacek found the Catalog easy to use and had no problems navigating to the areas he wanted to review. While he thought the production was in a good format for high school students, he would like more information on such things as suggested high school classes to prepare for particular majors and more data in general. He said it would take some getting used to since he is not very experienced with computers to start with.

End Users

The Catalog on Disk was also reviewed by students in a Parkway West Senior High School computer art class. Ms. Jill Gerber instructs the class and relayed the student feedback. The students found the disk to be new and exciting. None of them had ever seen or heard of an electronic college catalog. They liked the interactive aspects of the catalog, being able to pick and choose what they wanted to look at. Most of the students enjoyed this format over the traditional printed catalogs. Suggestions for improvement seem to follow the overall approval. The students would like more graphics, and even video clips. Some thought their parents would like to see video of well known professors talking about course offerings.

The Committee

The committee also shared a unanimous enthusiasm for the project. Pluses included the ease of updating and cost effectiveness of duplication. The subjects of posting the catalog to an on-line service such as CompuServe and porting the disk to a Microsoft Windows format were discussed. Some suggestions were to increase the size of the type on screen, and including testimonials from former and present students. It was decided that information on general education and core requirements would be valuable. The possibility of producing two disks with one targeted to students and the other to high school guidance counselors was also broached.

Catalog on Disk—Version 2.0

One word seems to sum up the suggestions on improving the Catalog, more. More information, graphics, video. The quickest way to implement this would be to use compression software. This method allows a disk to hold more data. The reason this was not used on the initial version is that compression software adds a level of complexity to the program. The program must be moved to the computers hard disk and then with a couple mouse clicks it is uncompressed. Using the feedback from the students, it does not appear this would be a big problem. Another solution would be to produce a CD-ROM. With 650 megabytes to play with, lots more information could be included! The price of publishing of a CD-ROM continues to drop. A master disk can be produced for about $2,000 with copies running around $2.00 per disk in quantities of 500.

BIBLIOGRAPHY

BIBLIOGRAPHY

"DOS Boot". *Advertising Age* February 17, 1992: s1

"Touching very touching". *Advertising Age* February 17, 1992: s14

Advertisement in *Advertising Age* June 29, 1992

"Interactive Art Magazine Coming to an Art Store Near You!". *American Artist* October 1993: 62

"Multimedia Productions Designs Callaway "Touch Tour"". *St. Louis Computing* March 1992: 15

Berkeley, Edmund. *Giant Brains or Machines that Think.* New York: NY Wiley, 1949

Betts, Mitch. "Self Service a Growing Trend for Customers". *Computerworld* July 20, 1992: 16

Breen Terry. "Guests Warm Up to Handy Machines". *Hotels* : 41–42

Caruso, Denise. "Interactive Learning: Integrated Media Moves to the Head of the Class". *Publish* April 1991: 75–80

Crump, Constance. "Attention, Kiosk Shoppers: Kmart tries interactive displays for some wares". *Crain's Detroit Business* December 2, 1991: 1–31

Cutler, Blayne. "The Fifth Medium". American Demographics June 1990: 25–61

Daly, James. "Hospital's Mac System Gives Voice to Bedridden Children". *Computerworld* July 13, 1992: 33

Diamond, Jonathan. "Tube view of colleges: Search by Video provides students with individual way to see campuses". *Philadelphia Business Journal* March 18, 1991: 1-29

Garrison, Ann. "Hot, Horny & Healthy". *Macworld* May 1992: 125

Godwin, Nadine. "What's New in video Applications for Leisure Sales". *Travel Weekly* March 21, 1988: 45–46

Goodman, Danny. *The Complete HyperCard 2.0 Handbook.* New York: Bantam, 1990

Grimes, Brad. "Can Susan Lucci be far behind?". *PC Magazine* June 29, 1993: 30

Guglielmo, Connie. "Wrestling with Multimedia: A Video Kiosk Helps Train for Olympic Gold". *Publish* August 1992: 71–73

Hartmann, C. R. "Interactive Marketing". *D&B Reports* July/August 1993: 60

Hebel, Sara. "High-tech college options challenge ritual recruiting: While traditional mailings work at some schools, computer discs are 'up-and-coming'". *Advertising Age* August 23, 1993: S8

Hess, Jack. "Tactile Training Tactics". *Training & Development Journal* June 1989: 16–17

Horn, Robert. *Mapping Hypertext.* Lexington Institute, 1989

Hutsko, Joe. "Ben & Jerry's Secret Ingredient: QuickTime". *Publish* May 1992: 55–57

Jacobson, Pat. "Save the Cities! *SimCity* in grades 2–5". *The Computing Teacher* October 1992: 14–15

Ladd, Barbara. "Interactive Training: Growing Steadily in Larger Companies". *Training* September 1989: 8–11

Manly, Lorne. "No Ink, No Paper, Lots of Readers". *Forbes Folio* May 15, 1993: 48–50

Martin, James. *Hyperdocuments and how to create them.* Prentice-Hall Inc: 1990 14–15

Nielsen, Jakob. *Hypertext and Hypermedia.* London: Academic Press Limited, 1990

O'Connor, Rory J. "Programming in Fine Art Out—brave new world of the 'interactive'". *San Jose (California) Mercury News* March 23, 1990: 16C

Parker, Carol. "HyperCard—A Science Teaching Tool". *The Computing Teacher* October 1992: 29–53

Schurenberg, Eric. "The Agony of College Admissions". Money May 1989: 142–150

Slater, Robert. *Portraits in Silicon.* Cambridge: MA MIT Press, 1987

Wojtas, Gary W. "School Daze". *Direct Marketing* September 1991: 28-48