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MASTER OF FINE ARTS

DESIGNING NAVIGATION FOR
INTERACTIVE MULTIMEDIA

BY

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What is Multimedia?

The use of multimedia is growing and expanding throughout the world. It is used for everything from entertainment and shopping to education. The potential applications are almost endless. Multimedia has been described as, "the integration of technology and the application of technology."[1] This integration of technology is the bringing together of both old and new forms of communication. It is applying traditional forms of graphic design into new ways of expressing ideas. Some of the new technologies are digital photography, computer animation, and digital sound. The word multimedia can be divided into two words. The word "Multi" which can be described as many, and the word "media" which can be described as the means of communication. Conceptually, multimedia is the bringing together of many different forms of communications into one integrated new form of expression. One of these forms of expression can be a computer program. The viewer or user of these programs can utilize navigation to interact with the computer. Navigation is how users access information presented to them through the medium of interactive multimedia. Giving users control of this navigation is described as interactivity. This thesis will examine the design of navigation for interactive multimedia. It will focus on basic principles that graphic designers can follow to create appropriate navigation for multimedia. Also, It will describe how I designed navigation for an interactive multimedia program titled "The Electronic Design Book."

Creating navigation for multimedia projects poses a great challenge for graphic designers. There are many different visual problems that designers must face when creating multimedia. Designers may need to wear many different hats. They might have to become computer animators, digital typographers, or sound editors. In creating multimedia, it is the graphic designer's job to link all these different factors together into one visually pleasing program. The linking of all these factors together is what

[1] John Faier, "The Truth About Multimedia" Multimedia Today Jan-Mar 1995 p.27

navigation is all about. Navigation can be described as the heart and soul of multimedia. It is what happens behind the back and in front of the user. Graphic designers need to know exactly where users can go throughout the entire program. This allows them to create appropriate interfaces that all interconnect and relate to each other. Everything from the interface's color and button design is required for proper navigation. The joining of several different visual images together is described as navigation for interactive multimedia.

Principles of Navigation

When designing for interactive multimedia programs there are several key principles and guidelines that designers can follow to keep users from getting lost or frustrated while interacting with the program. These principles and guidelines are not written in stone and I would encourage any designer to experiment with this medium. Interactive multimedia is still a very new form of communication and there are many ways of designing navigation that have not been discovered.

The first and most basic principle is planning. A well planned multimedia program can be created faster and more effectively. Planning is important because it gives designers an idea of what needs to be presented. The first step in the planning process is to define the user or "target audience." This target audience is the person that is interacting and navigating through the program. Once designers are aware of who their target audience is they are better able to create a proper interface that can relate to this audience. Each audience is different from age, race, and gender. They all respond differently to certain colors, icons, sound, and artwork. If designers study their audience they can better anticipate what will stimulate certain behaviors in that audience.

Another basic planning principle is to define the purpose of the program. This purpose is what users are to absorb or learn from interacting with the program. Defining this helps designers organize the information to be presented. Also, designers should plan how this program would be presented to users. Multimedia can be delivered

through a variety of media which can include television screens, video monitors, the internet, or computer screens. Each one of these platforms have different characterics and should be designed appropriately. This thesis focused on designing for the computer screen. When creating for the computer, designers will need to decide if the program will run on a Macintosh, PC, or both computer systems. All these basic principles should be planned out before beginning the production of a program.

Once the basic planning is completed, designers are able to begin creating the interface for the navigation. The entire interface is very important to the flow of the navigation because it will dictate how users will react to the different computer screens. The first step in designing for navigation is to create a flow chart. This flow chart is a visual representation of the entire extent of the project. It reveals to designers the links that need to be created for the navigation of the program. The most effective and easiest way to create a flow chart is on a chalkboard. Using a chalkboard allows the designer to quickly change and alter a flow chart.

Once the flow chart is completed, designers can use this flow chart to create the interface for the navigation. There are several guidelines that designers can follow to create an appropriate interface for multimedia programs. One of the best guidelines is to use metaphors. Using metaphors takes advantage of the user's knowledge of the world around them by giving them symbols that they can relate to. Metaphors are very popular in multimedia design and are used for everything from buttons to screen layouts. "Consistent use of the metaphor promotes learned associations, which in turn provide the familiar experiences that help users to grasp complex ideas."[2] This is taking advantage of the user's ability to quickly interpret symbols faster than a written word. In multimedia, metaphors usually take the shape of symbols as buttons.

Probably the most important design guideline is consistency. Keeping the

[2] Susan Metros, "Graphic Design for the Interface" Interactions July 1994 p.30

interface consistent from one screen to the next gives users knowledge of where they can click from screen to screen. "Consistency in the behavior of the interface means the people have learned how to do things such as clicking and pointing once."[3] Designers need to be consistent in the placement of buttons, artwork, and information. The important information should be placed in the center of the screen where it can be quickly viewed and interpreted. "Consistency in the visual interface helps people learn and they can easily recognize the graphic language of the interface."[4] This graphic language is the user's overall interpretation of the screen. In other words, they are able to read the information and understand were to go next. Users should be able to learn where to look on the screen for the important information. For example, the consistent placement of the title at the top of every screen helps users know exactly where they are within the program. Also, it is important to keep a consistent color scheme for the background, buttons, and information. This reduces eye strain on the users. For example, keeping the background color consistent throughout the program maintains a uniform color scheme. Consistency is very important for a well designed aesthetically pleasing interface.

Another important guideline is to give users total control of the navigation. This is giving them freedom to go wherever they need to within your program. It is important that users have control over everything from sound level to quitting the program. Giving users total control keeps them from getting frustrated with the navigation of the program. It allows users to concentrate on the information and not on the interface. Also, total control is important for the flow of the program. For example, all people read at different rates, therefore it is important to give users control to advance at their own pace. Another important user control is forgiveness. Forgiveness refers to letting users reverse actions. Letting users go backwards through the program for review of the information.

[3,4] Apple Computer Inc., "The Human Interface Design Principles" p.7

Another basic guideline designers need to consider is giving users feedback. Feedback is the process of giving users a response to their commands. "There should be relationships between the user's actions and the machine's responses."[5] This feedback can take several different forms. One way is through messages on the screen. For example, in Macromedia Director using the message "please wait loading program" is useful while users are waiting for a new program to be loaded. Also, simple feedbacks are very useful in indicating users actions. One of the most popular uses of simple feedback is to put sounds on buttons. A short "click" sound allows users to recognize that they have chosen a button.

Another basic guideline is aesthetic integrity. "Aesthetic integrity means the information is well organized and consistent with principles of visual design."[6] The designer's combination of visual elements needs to be pleasing to users. One of the best ways to create a layout is through a grid. Placing the objects on the screen within a grid unifies and organizes the visual information. A visual layout that users can view for a long time without being confused or having eye strain. Is your program pleasing to the eye? Does the overall look of the program relate to the target audience? Is the text readable? Has the graphic language added to the quality of the navigation? These are questions that designers must ask themselves when creating interface and navigation. This is building good basic design principles into your program.

The final basic guideline is to test a working model of the program. Once a working model has been completed, it is a good idea to test it on your target audience. Create an evaluation sheet for them to fill out while they are interacting with the program. Also, watch the tester and view their reactions. This will inform you if you have created proper navigation for the program. "There's no point in conducting this type of

[5] Susan Metros, "Graphic Design for the Interface" Interactions July 1994 p.33
[6] Apple Computer Inc., "Macintosh Human Interface Guidelines" 1992
[7] Susan Metros, "Graphic Design for the Interface" Interactions July 1994 p.29

observation exercise unless you have the courage to accept that you were wrong, swallow your pride and start again."[7] At this point you may have to change your whole entire interface design concept and start again. If you did proper planning and designing this is usually not the case.

Planning for The Electronic Design Book

In September of 1994 I was approached by Joyce Hertzon, a RIT Foundation professor. Several years ago she had produced an interactive Hypercard Stack of a collection of notes and lectures that is titled, "Too See." This Hypercard stack was a very linear computer program created only in black and white. The navigation of the program was a simple forward and backward button. There was not much interaction for users to explore. She indicated to me that she would like me to work with her to produce a highly interactive color enhancement to this Hypercard Stack. She would supply the text and artwork and I would be responsible for designing the navigation and visual interface.

Early on in the planning of this program, Joyce and I had to make some important decisions about the look and function of this program. As the graphic designer for this program, it was my job to create appropriate navigation to get users through the large amount of information that Joyce had written. Throughout the early stages of this project, Joyce and I had several meetings to discuss the overall program. I began by creating a checklist of ideas that we needed to decide on before I could start designing.

Our first decision was to define our target audience, or in other words, the user. We decided users would be Freshman and Sophomore students enrolled in a Two-Dimensional Design class. These students would range in age from 18 to 25 and have little or no design experience. They would most likely be working alone on a single computer. Defining these users early on in the project allowed me to begin designing a proper interface that could relate to this group. Our next decision was to determine the

general purpose of this project. We determined the purpose of this computer program would be to introduce users to basic two dimensional design theories. They would be introduced to a specific design concept and then be required to create an assignment using this concept. The users would have the choice of either doing an assignment by hand or on the computer. Defining the target audience and purpose were two basic decisions that were essential for the planning of the program.

Before I could start designing this program, we needed to make some important decision about how this program would be used. Since this program was to be used by RIT students, we decided to completely design it on the Macintosh computer platform. RIT design program uses strictly Macintosh computers. Also, this meant designing a program that would run on several different models of Macintosh computers. With this in mind, I decided to create this program entirely in 8-bit or 256 colors. Using 256 colors allowed me to create a program that uses less memory. This decision was based on the assumptions that this program would be running on older Macintosh computers that were not very powerful. Also, we decided to design for the standard Macintosh 13 inch monitor.

Our next decision was to determine the content of the information to be presented to the student. Some of the information for this program had already been written by Joyce. It was written in the form of a book titled the "Electronic Design Book." This book was written in a linear form, but has been adapted for a non-linear interactive function. This Electronic Design Book has been broken up into a number of different lessons. Each lesson would introduce users to different design theories. Within each of these lessons there would be five different categories: Concept, Environment, Examples, Hand Skills, Computer Skills. Each one of these categories or sections would present users with a different viewpoint or idea of a design theory. Also, we decided to give users total control to move within each section because they all relate to the same theory.
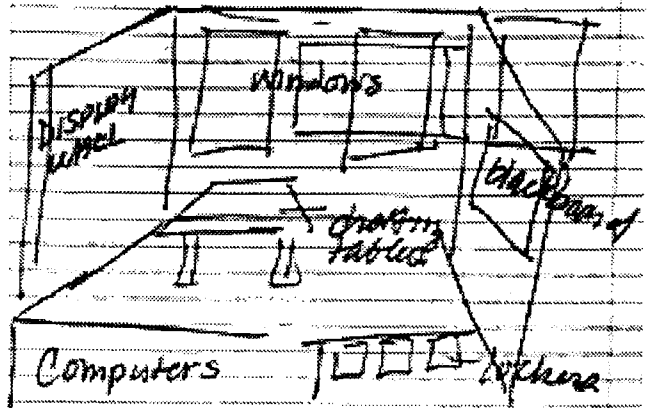
Figure 1
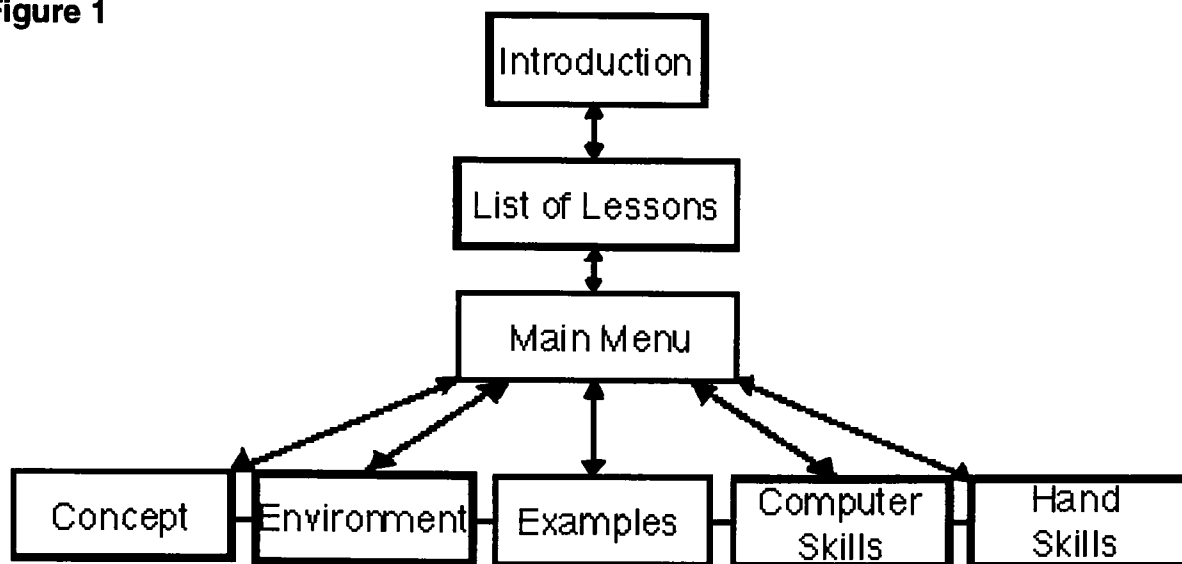
Planning Navigation for The Electronic Design Book

After the initial planning was completed, I was able to begin planning for the navigation. I decided to start by creating a flow chart. Creating this flow chart helped me visualize how to design the navigation for this program. This flow chart starts with an introduction (see Figure 1). This introduction would present users with basic navigation skills. After the introduction, users would be presented with a list of lessons. Upon clicking on one of the lessons they would go to the main menu for that lesson. At the main menu users are presented with a number of choices. Within the introduction, they are prompted to start with the "concept" section. Users have the choice to choose from any of the five categories or go back and choose another lesson. I decided to give users total control, because they may have had to quit half way through a lesson and needed to return to finish. Also, users are able to get from section to section within any section. This will keep users from having to always go back to the main menu. Creating this flow chart gave me a general outline to follow throughout the design of the entire project.

I began designing the navigation using this flowchart as a guide. I started in the middle of the flow chart by designing the main menu. Joyce wanted to use an illustration of a classroom for the main menu. This classroom would be filled with objects that are

normally found in a design classroom. Each one of these objects would represent a button to navigate to a different section. She had given me a quick perspective sketch of several objects within a design classroom (see Figure 2). These objects would be metaphors for the buttons. For example, the blackboard would represent the

Figure 2

"concept" section. This section would give users a lecture for this lesson. Also, she had visioned this as a virtual classroom. Users would move around the classroom in a simulated three dimensional space.

To create this three dimensional space I used the software program StartaStudio Pro. Using this program, I was able to create wire frame objects. Keeping the principle of metaphor in mind, we decided that a blackboard could represent "Concepts," a window could represent "Environment," a critique board could represent "Examples," a drawing table could represent "Hand Skills," and a computer could represent "Computer Skills." I placed these objects into a wire frame simulated classroom (see Figure 3). The

Figure 3
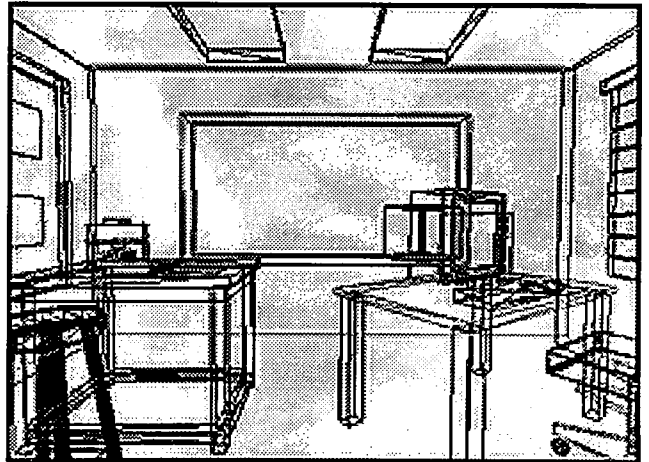
next step was to add color to these wire frame objects. I decided to texture map each object with a different color so users would easily recognize the different objects. I was able to place a camera in the back of the room so all the objects could clearly be visible from this angle. I was able to render this camera angle in full color and this became the

main menu (see Figure 4).

Figure 4

Using this rendered classroom, I was able to create five different buttons. Knowing that I wanted to use rollovers in Director, I imported the rendered classroom into Photoshop. Using Photoshop, I created five different scenes of the main menu. Each scene had one of the objects highlighted.
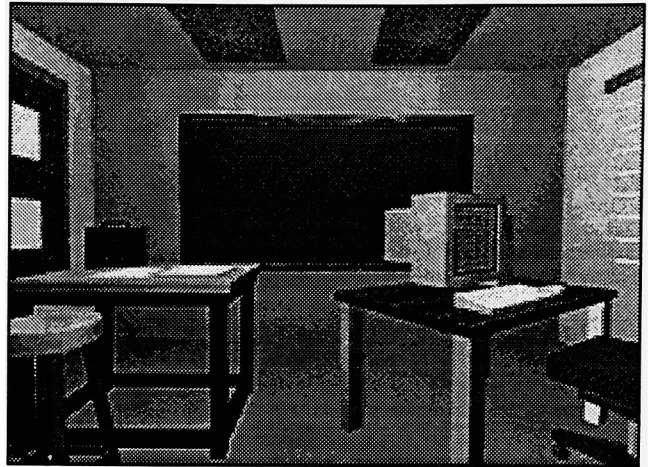
Using Director, I was able to create rollovers within the classroom. I designed it so when users move the mouse over one of the objects the classroom would switch to that object highlighted. For example, when users move the mouse over the blackboard it changes to a drawing on the blackboard (see Figure 5). Designing buttons this way informs users that this is in fact a button. These objects worked as metaphors for where the button would take users.

Figure 5

Once the main menu was completed, I was ready to create the virtual classroom. I created this by using the same Strata Studio Pro file that I used for the main menu. Using the animation section of this program, I was able to create a series of
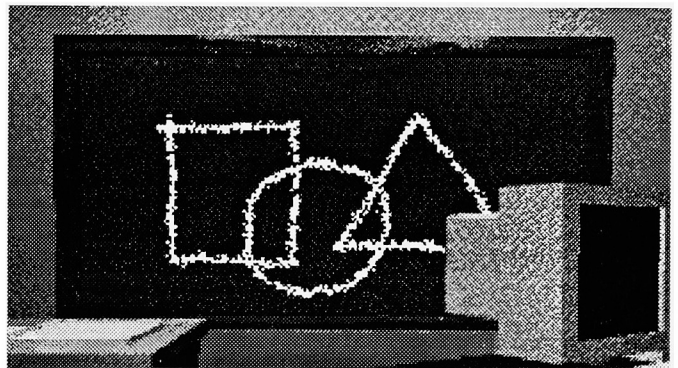
Quicktime movies. Each of these Quicktime movies would zoom into a different section of the classroom. For example, I created a Quicktime movie that would animate forward into the blackboard. All of these Quicktime movies were created in a wire frame mode. Creating these movies in wire frame allowed for smaller and less memory movies. This was important for smoother and more realistic animation within Director. The whole

virtual classroom was based upon these Quicktime movies. Once users click on an object in the classroom, the view of the classroom would change to a wire frame drawing. The wire frame drawing would then animate, by using the Quicktime movie, into that object. Once the animation was completed, a closeup of that object would become the sub-background color for that section. I designed the classroom this way so each section would have a different sub-background color. This would help reinforce to users what section that they were in. Once they were completed with that section, users would be able to click on a button that would animate the screen back to the main menu.

After I had completed the navigation for this main menu, I was able to start designing the different sections. Creating a larger interactive program in Director requires breaking up the program into many smaller programs. In Director these smaller programs are called movies. Director allows designers to link several smaller movies into a seamless larger program. This allows users to navigate from one program to the next without realizing they are going to a different movie. This process of breaking up a large interactive multimedia program into many smaller movies is the heart of Director's interactivity. My goal for this program was to create a separate Director movie for every section. The introduction, main menu, and all five sections would be different movies all linked together. There would be buttons within each movie that would take users to the other movies. One of the most important navigational ideas is to keep each movie as small as possible. This keeps users from waiting for a long time for the computer to load a different movie. I was able to keep my movies as small as possible by making sure each was 8-bit. Also, I used a shared directory. This shared directory is a movie that hold cast members that are shared by all movies. This helps limit the load time because shared cast members always stay loaded into memory. Also, for the body copy text I used Director field text. This is text which is vector based and requires less memory than bitmap text.

I was now ready to begin designing the individual movies. I needed to design a common background that I could use throughout the entire program. Using Photoshop, I designed a neutral gray marbleized background. I used a gray background because I wanted the buttons and individual sub-backgrounds to clearly stand out. This gray background needed to be set early on in project because it would set the color scheme for the entire program. I designed all buttons and text to relate to the color of this background.

Figure 6

Once I had the background color set, I was able to begin designing the buttons. Most of the buttons for the program were designed in the form of icons and symbols. Using the principles of metaphors, I designed unique buttons for each operation. I wanted to design buttons that would graphicly represent their function. The first three buttons I designed were the Help, Quit, and Print buttons (see Figure 6). I designed the "Help" in the form of a question mark. This button takes the user to a screen that explains the navigation of the program. For the "Quit" button, I designed an open hand. This metaphor represents stopping. This is like a traffic cop stopping traffic. For the "Print" button, I used a rectangle with a smaller rectangle on top of it with lines going across. This button is fairly abstract, but I believe it can represent a laser printer. Each one of these buttons had a rollover placed on them. When the user places the mouse over it the button will change to a word that it represents. This rollover reinforces to the user exactly where the button would take them. I placed these three buttons at the bottom of the screen because they are buttons used less frequently.

Figure 7

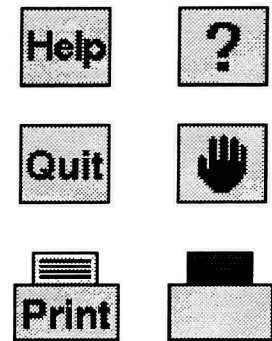The main navigation consists of three buttons. They are the forward, backward, and main menu buttons (see
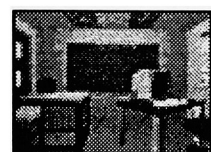
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Figure 7). The forward and backward buttons were also designed in the form of a metaphor. They are designed in the shape of a pointing hand. This pointing hand represents looking in a new direction. These buttons are used to navigate the user from one screen to the next within a section. On the other hand, the main menu button was not designed in the form of a metaphor. It is a small thumbnail picture of the main menu screen. This button literally represents where it will take users. Once users click on this button, the screen will change to a wire frame Quicktime movie that animates back to the main menu.

Figure 8

Lecture

Environment

Examples

Computer Skills

Hand Skills

The last buttons I designed were the buttons to navigate the user from section to section (see Figure 8). These five buttons are stacked vertically along the left side of the screen. I created these buttons by scaling down the the background of each section. Once these objects were smaller they were still recognizable. All these buttons are different colors and they all relate to the color of the sub-background of that section. These buttons had rollovers placed on them. When the user would place the mouse over the button, the section title would be displayed. Also, these buttons were helpful for letting the user know what section they were in. I shaded every button except the button of the section they were presently in. These buttons were also used for leading users through the sections. When users finished a section, the button for the next section would flash.
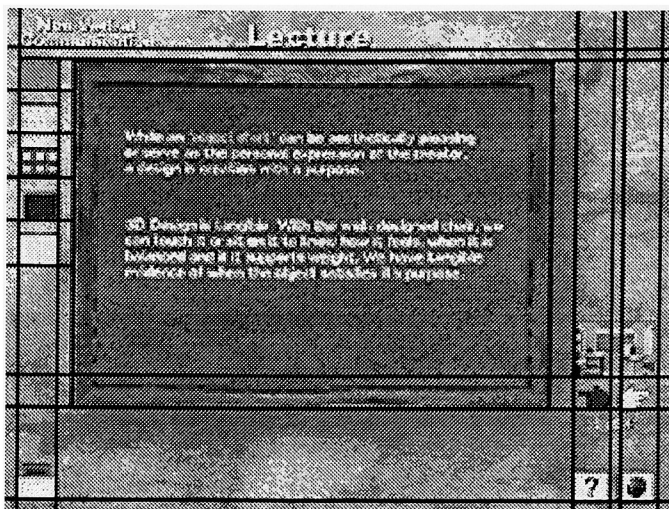
Once I had the buttons completed, I was able to begin designing the layout of the screen. This layout of the screen would stay consistent throughout the program. For example, the title would always stay at the top of the screen and the main body of

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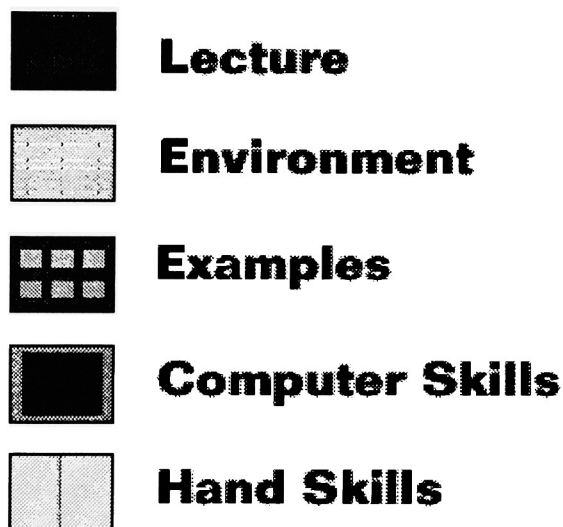
information would be in the middle. A

Figure 9

consistent layout helps the user
distinguish where they are throughout
the program. The buttons were
grouped together and placed in the
same position within every movie. The
entire layout was designed around a
constructional grid. Buttons, text, and
artwork were placed proportional to
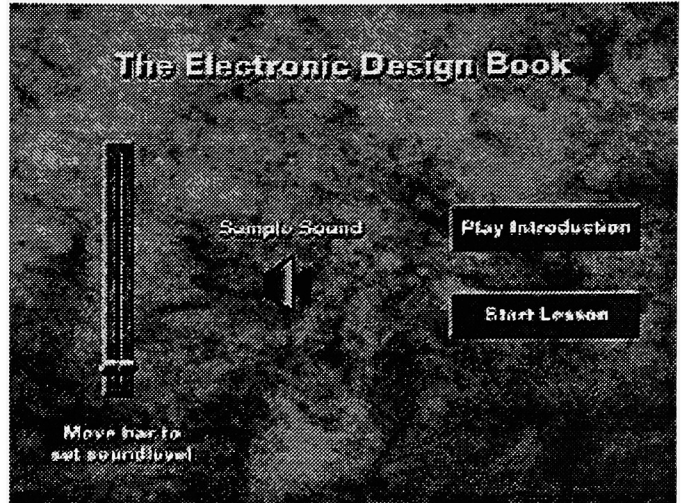each other on the screen (see Figure
9). This consistent placement of the buttons allowed users to learn where to click. Also,
all of the buttons that were grouped together would have simular behavior. For example,
the buttons at the bottom of the screen would all have rollovers that displayed text of
where that button would take users. The main navigational buttons were grouped
together in the middle right of the screen. I grouped these buttons together because
they were the buttons used most often. The buttons for each section were placed in the
upper left side of the screen. These buttons were stacked upon each other for easy
reconignition. They are stacked in the order that they are to be used. By grouping these
buttons together, I was able to keep the user from moving the mouse all around the
screen for the navigation. Once the user had navigated through a few screens, they
would quickly learn the interface.

Once the layout was completed, I was able to begin adding the information and
artwork for each section. This information was in the form of photographs and text. I
added a black line around each of the photographs to create a picture plane to contain
the photos. This was important for users to properly visualize the artwork. Also, there
was to be a significant amount of text for each screen. I decided to use the font Folio
medium (see Figure 8). This is a san serif font that is easily readable in 14 point size. I

placed the text within a dark gray field. **Figure 10**

This gray field behind the text assisted
in the readability. The artwork and text
layout would stay consistent throughout
all five sections.

Once the main menu and the
five sections were completed, I was
able to design the introduction. I used
this introduction to present users with
the basics of the interface and
navigation. Since users were to be working alone, I decided to give them total control
over the sound level. On the first screen the user is presented with a sliding bar that
sets the sound level (see Figure 10). Users are able to move this bar to an appropriate
sound level. Also, there is a button for a sample sound that they can use to help set the
sound level. Once the sound level is set, users are presented with two buttons. One
button is to play the introduction. The other button is to skip the introduction and go

directly to the list of lessons. This gives   **Figure 11**
users total control to start with the lesson.

If users click on the "Play
Introduction" button, they are presented
with a short animation of going down a
hallway and into the classroom. This
animation gives users a feeling of actually
going to a class. It was created in Studio
Pro and is a fully rendered Quicktime
movie. I used Premiere to compress this
movie to 10 frames-per-second. This was

important for proper Quicktime playing in Director. Once this Quicktime movie is completed, the screen blends to another Quicktime movie of Joyce welcoming users to the Electronic Design Book. This presents to users with a human instructor (see Figure 11). Once this Quicktime is completed, the screen blends to a sample of the main menu. At this sample, users will hear audio instructions on how to navigate around the main menu. As users move the mouse around the room, text is displayed to give users a written description of that section. The sound for this part of the introduction was created using an audio only Quicktime movie. This allows users to both hear and navigate the main menu. I have given users the option to stay on this screen for as long as they need to learn the navigation. Once users click on the "continue" button, the screen blends to the list of lessons. Another Quicktime movie of Joyce blends on to the screen. She explains to users what they are to do and then fades out. Users can now choose a lesson.

I created this introduction to present the Electronic Design Book to users. It introduces users to the color scheme and the navigation of the entire program. They are able to stay within this introduction until they have learned the navigation. Also, I have giving users total control over the sound level for optimum sound performance. They can choose to bypass this introduction and go directly to the list of lessons. This is an example of given users total control over the interface. Introduction to multimedia programs is very useful in giving users an idea of the what to expect throughout the program.

Once the introduction, main menu, and five sections were completed, I was able to create a projector file to run the entire program. This projector file is what makes the Electronic Design Book a computer program. It is a software program created by Director that is utilized to play all the other Director movies. There are three important attachments that need to be added to this projector file. First, it is important to imbed any fonts used in the entire program. Using the program Font DA Mover, I was able to

add the fonts to the projector file. This insured that fonts would be displayed properly while running the program. Second, it is important to use Finder Hider. I accomplished this by dragging the projector file on to the Finder Hider software. This software adds black space around the entire program. This is very important for users running the program on a very large monitor. Third, it is important to allocate memory for your program. I accomplished this by selecting the projector file and using "Get Info" under the file menu on the desktop. Here you will be able to set the amount of ram used by the projector file. By doing this will insure proper running of all the movies. Placing all three of these things into the projector file insures proper navigation of the program.

Conclusion

I was able to build all the important principles and guidelines into the Electronic Design Book. I started creating this program with lots of planning. By working with Joyce, I was able to make some important decisions about the program. We were able to define the target audience and the computer platform. These two decisions were important because they dictated how to design the program. Also, I was able to develop a flow chart from Joyce's written information. Once the initial planning was complete, I was able to begin designing the navigation. I was able to set a color scheme from using the neutral gray background. The colors of the buttons, text, and artwork related to this gray background. This color scheme was consistently used throughout the program. I have taken advantage of using metaphors for some of the buttons. These buttons are symbols and icons that related to the direction of the buttons. In the layout of the screen, the buttons were grouped together in a certain navigational grid. Within this grid common buttons were grouped together. There placement within the layout was critical to the flow of the navigation. This screen layout remained consistent throughout the program. Also, I was able to build feedback into program. The most basic feedback is the "click" on every button. This sound reported to users that they had selected a button. These buttons would also change color with a mouse click. This further reinforced the

feedback of a mouse click to users. By using all the principles and guidelines for navigation, I was able to design a creative and effective interactive multimedia program.

I have created the Electronic Design Book because I am a strong believer in the use of computer to help educate students. I have focused this thesis on navigation because interacting with the computer is how students will learn through the computer. The students are able to move through the information presented to them at their own pace. Also, I wanted students to have a study guide to go along with traditional lecture education. The computer is a very visual medium and is able to present visual examples in a entirely new way. Students can view design examples blending together and can see how they fit together into a design theory. Also, the computer is becoming more part of the designer's job. While introducing design students, early on in their education, to the computer allows them to become more familiar with this medium.

Bibliography

Faier, John. "The Truth About Multimedia," <u>Multimedia Today,</u> (Jan-Mar 1995)p.

Metros, Susan. "Graphics Design for the Interface," <u>Interactions,</u> (July 1994 p.

<u>Macintosh Human Interface Guidlines</u>. New York: Addison-Wesley Pub, 1993

Stoll, Clifford. <u>Silicon Snake Oil</u>. San Francisco: Anchor Books, 1995

<u>The Human Interface Design Principles</u>. New Yory: Addison-Wesley Pub, 1992.