

## Part III. Interactive Multimedia Authoring Basics

### Chapter 8. User Interface and Graphic Design

#### Chapter Objectives

After completing this chapter you should understand and / or recognize:

- Understand the learning process and the facilitation of learning through the use multimedia technology;
- Understand how to design the user interface taking into consideration the psychology of learning.

#### Psychology of Learning

As you remember from Chapter 1, the purpose of multimedia technology is to communicate messages, ideas or content making use of two or more media which appeals to more than one of our senses. In summary multimedia is a multisensory experience. We then use multimedia communication technology to increase knowledge retention and to increase understanding.

In order to better understand the function of multimedia lets examine how our brain works in relation to learning. Information enters into the human brain via our senses, fundamentally through the eyes and ears. When our attention is directed by the gathering of information by our ears and eyes this information is transferred into the working area of our brain. While the information is in the working memory, it must be used or practiced in some way to be learned or it will be lost. This process is called rehearsal. The information to be retained (encoding) needs to be transferred from the working area and stored in the long-term memory. This information to be used it must be retrieved from the long-term memory to the working area for processing. In summary, there are four steps in this process: attention, rehearsal, encoding, and retrieval (see figure 8.1)

Figure 8.1 The learning process.

A well designed multimedia application will help to call the attention of our senses, will facilitate and enhance the rehearsal process and support and facilitate the retrieval process by supporting the association of sound, text and images about a concept. The sum of the above will facilitate and enhance the retention of knowledge. For example, you see in a monitor photo of an eagle, you see the word eagle and listened to the sound of the air and the eagle you will easily retain the concept of the word eagle.

Figure 8.2 The use of text, images and sound greatly improve the retention of knowledge.

Another of the aspects of the aspects that you need to take into consideration is the management of cognitive load-the amount of information people can assimilate.

Management of cognitive overload is critical in designing effective multimedia applications. If you bombard your audience with too much information at once (cognitive overload) it becomes an obstacle in learning, as a result the multimedia application has not met its goals.

To experience this content in a multimedia format open your CD-ROM in Chapter 8 of the Interactive Guide to Multimedia.

This chapter will examine the multimedia application interface and graphic design in the context of the enhancement of the learning experience and the increase in knowledge retention.

### User Interface Design Considerations

According to Dr. Ruth Colvin Clark<sup>1</sup>, an instructional designer, there are eight fundamental rules to follow for designing computer based instruction, these are:

- Keep cognitive load low with simple, consistent screen design and sparing use of text, sound motion and color.
- To avoid dividing the learner's attention, use various media elements such as text, graphics and sound to present reinforcing rather than disparate message.
- Use color, arrows, shading, and sound-sparingly-to direct the learner's attention to important parts of the message.
- Keep visible on the screen the information the learner will need to refer to during the instruction, especially to respond to questions.
- Clear working memory by encouraging frequent rehearsal, which moves information into-term memory.
- Encourage dual encoding through the use of concrete words and different modes-for example, text graphics, and sound-to reinforce a message.
- Avoid rote repetition in your interactions. Instead, design interactions that match job activities and skills.
- For procedural skills, encourage encoding specifically through the use of high fidelity simulation practice. Simulations should replicate the actual job environment as closely as possible.

Lets examine in detail each one of these design criteria's in order to understand their implications in regards to the design of the user interface in different kinds of multimedia applications.

### Interface Design and the Psychology of Learning

To experience and understand each one of these design criteria's and the relationship to the psychology of learning open the CD-ROM in Chapter 8 of the Interactive Guide to Multimedia.

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<sup>1</sup>Ruth Colvin Clark, 1995, Chapter 1, Authorware Multimedia and Instructional Methods, Taking the Plunge, Macromedia Authorware, Version 3 Training Manual.

1. Keep cognitive load low with simple, consistent screen design and sparing use of text, sound motion and color.

Multimedia technology empowers us the possibility of integrating a large number of resources such as video, audio, text, animation's, images, rich graphics, etc. You might be tempted to show all your creative capabilities by using all of the above into a single screen, but, hold down. Do not overload your application user, **KEPT THE SCREEN SIMPLE, CLEAR, USER FRIENDLY AND ELEGANT**. Figure 8.3 presents a good example of a simple, user friendly screen composition.

Figure 8.3 This screen is part of an instructional multimedia application entitled Brush Strokes About the Spanish Culture developed by Rafael Torrella, Roy Luna and Oswaldo Lopez of the Miami-Dade Community College, Wolfson Campus.

2. To avoid dividing the learner's attention, use various media elements such as text, graphics and sound to present reinforcing rather than disparate message.

It is critical to remember how humans learn, lets review this process. Information enters into the human brain via our senses, fundamentally through the eyes and ears. When our attention is directed by the gathering of information by our ears and eyes this information is transferred into the working area of our brain.

In designing a screen, use various multimedia elements to present the same message, do not bombard the user with different messages or pieces or information at the same time using different multimedia elements. The right approach is to reinforce the message with different elements. As you recalled from Chapter 1, we all have different learning styles. The objective when designing a screen is to be able to appeal to different learning styles by communicating the same message, information, or idea by using sound, text, graphics and other resources.

Figure 8.4 illustrate the above concept. This movie is presented in Chapter 8 in your CD. Notice how the idea is presented and reinforced by the voice over, the text and animation. We hope that by integrating all these elements we will achieve knowledge retention in the application user.

Figure 8.4 In this screen the information is reinforced by the integration of text, audio, animation and graphics.

3. Use color, arrows, shading, and sound-sparingly-to direct the learner's attention to important of the message.

The use of arrows, colors and animation to direct the user's attention is important to achieve the application goals. Lets examine the example presented in figure 8.5.

Figure 8.5 This screen is part of an instructional multimedia application entitled Observing Before Judging developed by Thelma Altshuler, Louis Molina, José Lozano and John Villamil of the Miami-Dade Community College, Wolfson Campus.

Figure 8.5 illustrates the idea of integrating animation and graphics to have the users attention and indicating him or her the next steps.. To experience how this design criteria works please refer to the CD of the Interactive Guide to Multimedia. Please notice that the background, icons and navigational tools are consistent with the theme of the application. Clear instructions are provided to the user and an animation directs the user on what to do.

4. Keep visible on the screen the information the learner (user) will need to refer to during the instruction, especially to respond to questions.

On-line instructions and access to support information is important to be incorporated into the screen and user interface design. Frequently we have experience multimedia applications where the user need to guess what to do next, where to point and click to continue. Also, there is very few only support or help screens or access to tutorials or dictionaries. Specially in training and educational applications this is very important.

Figure 8.6 illustrates the use availability of help screens such as tutorials and instructions. To experience how this design criteria works please refer to the CD of the Interactive Guide to Multimedia. Please notice that an icon is provided to guide the user to a tutorial on the subject.

Figure 8.6 Tutorial help is provided to the user by selecting and clicking on the Help button.

5. Clear working memory by encouraging frequent rehearsal, which moves information into-term memory.

Particularly in training and educational multimedia applications you need to design and integrate practice exercises after presenting a subject. These exercises will help the user to reinforce the learning by transferring the information from the working memory to long-term memory.

Figure 8.7 Practice exercise part of an instructional multimedia application developed by Thelma Altshuler, Louis Molina, José Lozano and John Villamil of the Miami-Dade Community College, Wolfson Campus.

Figure 8.7 illustrates an example of practice exercises. To experience how this design criteria works please refer to the CD. Notice that the user is asked to respond to a

question in which he or she needs to apply the concepts presented to him or she.

In a business or marketing application you might want to include a screen that will summarize the major aspects presented about an issue or topic before moving to a new topic. This will help to reinforce the items discussed.

6. Encourage dual encoding through the use of concrete words and different modes-for example, text graphics, and sound-to reinforce a message.

It is easier for all of us to remember concepts, places, information, people, structure, processes if we can associate them with something that is familiar to us. It is difficult for most people to remember abstract ideas or concepts as opposed to concrete concepts. For example if you listen to following list of words-car, soul, style, comprehension, liberty-which one of these you will be most likely to remember several days later. For sure you will remember the word car. The reason why you will easily remember the word car is because it has a concrete meaning to you. The word car can be associated in your mind with a picture, a sound and the experience of riding a car.

As a multimedia architect you need to use the design elements (sound, graphics, video, text, animation, etc.) to make the ideas presented as concrete as possible.

Figure 8. 8 Hotel marketing interface illustrating dual encoding.

Figure 8.8 illustrates an example of dual encoding. To experience how this design criteria works please refer to the CD. This is part of a marketing presentation of a hotel. The strategy is to associate the hotel name with a beach. The beach is a very pleasant concrete concept that the audience will easily remember. Notice that the navigation icons have beach motives.

8. Avoid rote repetition in your interactions. Instead, design interactions that match job activities and skills.

To reinforce the learning process a well designed multimedia application will help to call the attention of our senses, will facilitate and enhance the rehearsal process and support and facilitate the retrieval process by supporting the association of sound, text and images about a concept. To facilitate the retrieval process you must facilitate the practice of concepts, ideas, processes by designing excersizes. In general there are two basic ways to rehearse information:

- Simple Rehearsal (rote repetition) - you might want to repeat a phone number, a brand, or model. This is also known as simple rehearsal.
- Elaborative Rehearsal - in designing a multimedia that encourage elaborative rehearsal you need to include excersices that requires from the user to apply knowledge in an appropriate context.

Figure 8.9 illustrates an example of practice exercises. To experience how this design criteria works please refer to the CD in the Interactive Guide to Multimedia.

Figure 8.9 This is a critical thinking exercise part of a philosophy multimedia educational application entitled Plato's Theory of the Form developed by Thelma Altshuler, Richard Jenaro and John Villamil of the Miami-Dade Community College Wolfson Campus.

8. For procedural skills, encourage encoding specifically through the use of high fidelity simulation practice. Simulations should replicate the actual job environment as closely as possible.

One of the best ways to achieve encoding is by engaging the user into simulation practice. Simulations on a computer could be made as real as your programming skills allow you. This is where the multimedia team is so important. The content specialist will provide the team with the description and processes involved in the simulation. The team members must then develop graphics, sounds, animations, responses, interaction, etc. that will help the user to engage itself in the virtual reality of the simulated situation.

Simulations are so powerful and important to the user learning due to the fact that it is usually a one to one experience. Nobody but the computer will know how the simulation exercise is going. The fear to make mistakes is gone, the concern that others know that the user is not mastering the content is not there any more. To this user it is vital that you provide as much on-line help and tutorials as possible. You must try by all means to provide all possible ways of support as presented in the above design criterias.

Figure 8.10 presents a screen shot of Sim City 2000, this simulation program was developed by Maxis Corporation. This is a multimedia program that simulates the development and management of a city. It is a multipurpose program. It is usually market as game but is an edutainment program.

Figure 8.10 Budget dialog box from Sim City 2000 by Maxis.

One of the key in components in the development of a simulation program is the documentation that goes along with the computer program. The documentation and the on-screen instructions and or support will help to guide the user to accomplish the educational and training goals. Thus, when developing a simulation program or a simulation component of a training program it is very important to develop the documentation and instructions for the use of the simulation.

Exercise: Creating your Interface Design

Using the above interface design criteria, analyze and revise your proposed storyboard and multimedia building blocks design to reflect these criterias.