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## The practical application of art and technology: delivering interactive educational content to young children

Elma Sue McCallum

*Louisiana State University and Agricultural and Mechanical College*

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THE PRACTICAL APPLICATION  
OF ART AND TECHNOLOGY:  
DELIVERING INTERACTIVE EDUCATIONAL CONTENT  
TO YOUNG CHILDREN

A Thesis

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Master of Arts in Liberal Arts

in

the Interdepartmental Program in Liberal Arts

by  
Elma Sue McCallum  
B.F.A., Louisiana State University, 1977  
May 2002

## ACKNOWLEDGMENTS

I would like to acknowledge the significant role my son, Levi, played in the creation of this thesis project. He is the voice of Cindy the Citizen Crab and Roy the Responsible Rabbit. His contribution to the sound effects and his tactfully kind, nine-year-old boy perspective made this project more complete on many levels. I would like to thank Kristin Bourgeois for her delightful narration of Fran the Fair Frog and Michael Bourgeois for his assistance in the audio booth. A special thanks to my husband, Donald, for keeping our ship afloat.

I am eternally grateful to my graduate committee, Herb Goodman, William Demastes and Gerald Bower, for accommodating a square peg and allowing me the freedom to create a project that is close to my heart.

I would like to thank the LSU AgCenter for making it possible for me to pursue my master's degree. Finally, this project would have never happened without the wonderful Character Critters stories developed by LSU AgCenter Family and Consumer Sciences specialists Dr. Rebecca White and Leslie Cooper Parsons. Character Critters stories are copyrighted by the LSU AgCenter and are used with permission in this thesis project. My sincere thanks.

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## ABSTRACT

I like simple things. More precisely I like taking complex things and distilling them to their simplest elements, those things that define their nature. Art and technology are two very different subjects. Simple and complex. Intuitive and analytical. Combining art and technology to deliver educational material with simple navigation, a child-friendly environment and playful, imaginative sounds that enhance rather than complicate the learning process, is the objective of my project. An interactive, educational CD for young children is the product of this thesis.

Art has always been used to communicate ideas, thoughts and emotions; it expedites the delivery of the message. The visual language is a universal one. Seeing is believing. Believing is understanding. Understanding is learning.

Blending art and technology for a practical purpose intrigues me. I enjoy children's books and have collected them for many years. Children's picture books rely heavily on images to support the story and ultimately to teach. Because a child uses all of the senses to learn, interactive multimedia is the perfect vehicle to deliver educational content to young children.

Technology allows us to depart from traditional methods of delivering educational content, like books, and produce materials enriched with images, sounds and interactivity. The possibilities for creating unique educational experiences have greatly increased.

The goal of this project is to create a fun, learning environment, encouraging interactivity by the target audience, young children ages three to six. The product of this thesis, the Character Critters Storytime CD, includes three animated stories about Cindy the Citizen Crab, Fran the Fair Frog and Roy the Responsible Rabbit, written by LSU AgCenter Family and Consumer Sciences specialists Dr. Rebecca White and Leslie Cooper Parsons. The copyrighted stories are used with permission from the LSU AgCenter. Through sight, sound and touch, with parent/teacher participation, children are invited to hear stories and play games that teach positive character traits. Each story includes an interactive game that reinforces the character concepts taught in the stories. Macromedia Flash, an interactive multimedia software, is used to develop the CD.

## INTRODUCTION

Because this thesis is concerned with the practical application of art and technology in the delivery of interactive, educational content to young children, it is appropriate to mention that I have been a graphic designer and illustrator for 25 years. Because of my long history in graphic design and art-related fields, I have seen technology change the way designers deliver art. With the introduction of computers as a design tool in the early 1980s, initially, the computer appeared to be a machine to be wrestled with in the process of producing work. On the surface, it was totally out-of-sync with the way an artist thinks. It is a right brain, left brain thing.

After several years of working with the computer to create design work, I began to understand the computer and what it could do for my work. At some point, a few years ago, I had an epiphany and began to understand the computer on a different level. My creative ability and my computer knowledge seemed to fuse into a symmetrical, synchronized entity. It was the other necessary part of the creative process. The computer, because of its great speed and ability to allow me to do things that I had not been able to do before, was running side by side with my creative impulses. It was keeping up. It had released a level of creativity within me that had not been possible before because my physical, mechanical side could not produce as quickly as my creative side could imagine. Some ideas were forgotten and left behind, because they came and went too quickly. Other ideas were discarded because they were not possible, too costly or laborious.

Not only had the technology freed my creative spirit, but I began to understand the computer's language. It was no longer a complex tool that was separate and apart from my intuitive, artistic side. It was a dance partner that would follow my lead. I began to intuitively understand and work with the computer and, conversely, I developed a more strategic, analytical approach to my design work.

This philosophy is the undercurrent and driving force in my thesis project. It pushes me to find better ways to blend the right and left sides of a creative mind in a technological world. In the following discussion, I approach what I think are the critical elements in the production of the Character Critters CD from a blended artistic and technological perspective.

## DESIGN

Creating a new world is never easy. Designing the Character Critters environment was like creating a new world, one that would be comfortable, fun and appealing to a child. Developing an environment that would hold a child's attention and make learning a seamless part of the whole experience is a daunting challenge. Again, the idea of simplicity becomes important because each character must be uncomplicated without becoming bland, fun without becoming overdone.

The "jelly bean" philosophy made this job easier to tackle. The idea that the Character Critters world should be like a bag of jelly beans, filled with brightly colored, rounded treats helped to change my mind-set and see things as I believe a child would. This concept sets the "visual tone" or personality for the project.

Consistency in style is always important in any design project, and this was no exception. Each character was developed by breaking down its elements into simple, friendly shapes, uncomplicated movements and expressions that exhibit their personalities and tell the story.

Rendering of the images was done in Adobe Illustrator software and imported into the Macromedia Flash environment as RGB, vector files. This is a very cumbersome and tedious process, as well as a frustrating one. Color results are unpredictable, making it necessary to redo the color on each part of the illustrations once they are imported into Flash. This becomes even more painstaking because of the grouping, ungrouping and breaking apart of an image required in Flash to color it. Flash's illustration functionality is awkward at best. Luckily, Flash's feature of importing and maintaining Illustrator files as vector graphics makes it easier to change the image for the purpose of animation. This also creates a smaller file size than importing bitmap images, always an advantage when anticipating playback on various computers. Once the illustration importing process is completed, Flash's true nature as an interactive multimedia program begins to shine.



## ANIMATION

The images set the stage for the critters' world, but the animation breathed life into its characters. Many years ago when I was in college working on my bachelor's degree I took a beginning film class and worked primarily in animation. That was 25 years ago and, while technology has changed the process from pin-registered, frame-by-frame animation to computerized animation, the basic concepts are the same. Creating animated sequences still requires an understanding of timing, motion and subtle image changes. You must be able to see beyond the surface of a thing; you must be able to break it down to its essential parts and see how the elements work together to create the whole.

The animation involved in the Character Critters stories is simple: basic movements enhance each character and its surroundings. Because the CD is played back on a computer and computers vary in size, particular attention is paid to creating small file sizes. For this reason, and also because of the appropriateness for the target audience, elaborate motion, fades and special effects are at a minimum. Again, I like simple things, and the simplicity of the animation serves the telling of the story by not smothering it or hiding it behind a lot of splashy bells and whistles. A genuine and clear message is delivered, aided by the images, movement and sounds, not in spite of them. Less is more.

Tweening is a feature of the Macromedia Flash software where an image is created for beginning and ending frames of a motion sequence and the computer interpolates the frame stages in-between to complete the animation. This function is used as often as possible because it creates smaller file sizes in comparison to frame-by-frame sequences.

Also, because of the target audience and the consideration for small file sizes, character expressions are limited to economical gestures, meaning those that create the greatest amount of story value without significantly adding to file size. Easy to read, comprehensible gestures and movements offer advantages in three important areas: appropriateness for target audience, smaller file sizes for more reliable playback and harmony with the stylistic quality of the project.

## NAVIGATION

The structure of the Character Critters Storytime CD was designed to create an easy navigation for children without compromising the experience. Although parents and or teachers are encouraged to be a part of the child's interactive encounter, the navigational architecture is developed for the child, offering audio prompts and visual clues to available options. This helps the child to understand what is going on and is intended to make him or her feel in control of the Characters Critters world.

The CD opens with an introductory page or scene, welcoming the viewer and introducing each character, Cindy the Citizen Crab, Fran the Fair Frog and Roy the Responsible Rabbit. The viewer is invited, through the narration, to “click” on a character to read that story. At any time the viewer may exit the CD by clicking on the stop button. Navigation in the welcome scene is limited to choosing one of the three character stories or exiting the CD (Figure 1).



FIGURE 1. Character Critters Storytime, welcome scene

Once a character has been chosen, the CD plays a brief scene introducing the character, its character traits and giving the viewer a hint of what the character will encounter during the adventure (Figure 2). The navigation bar changes after the character intro scene to include a story button, allowing the viewer to choose another story by moving back to the welcome scene, a stop button that opens the credits page and ultimately offers the viewer a way out, and a game button inviting the viewer to play a game. The movie continues to the title scene where the narrator announces the title and then proceeds to scene one of the story without being prompted by the viewer. Because the primary audience is young children, with the assistance of their parents or teacher, the continuous play method was chosen to deliver the story so as not to interrupt the child's story experience with complex navigation or options. Once each story has played through and ended, the animation stops (Figure 3). The viewer must then choose to exit, view another story or play the game.



FIGURE 2. Cindy the Citizen Crab, introduction scene



FIGURE 3. Cindy the Citizen Crab, scene 3

Each game is designed to enhance and reinforce the positive character traits exhibited in its respective character story. For example, children are asked to help Cindy the Citizen Crab pick up the trash and put it in the trash can. When the child uses the mouse to drag the trash into the trash can, the positive behavior is rewarded with stars bursting out of the can. The narrator praises the child with encouraging phrases like “good job” or “ You are a good citizen.” At any time during the game, the child may exit or view another story.

## AUDIO

Sound is another one of those elemental features that can speak volumes. Sound, like the images, sets the stage for the whole experience. Good clear audio and the effect of a “boing” or a “beep-beep” at the right time can add a tremendous amount of excitement to the final interactive project. Poor sound quality can adversely affect the scene and, consequently, the entire movie.

Initially, canned or stock sound effects were chosen to enhance the critters’ stories, but that idea was later abandoned in favor of simpler, original sound effects. These effects were created with rudimentary instruments like a harmonica, jaw harp, paper and a jar, to name a few. Improvisation was the key to developing the sounds. My nine-year-old son makes a pretty good siren, car engine and “beep-beep.” These “homemade sounds,” rather than typical studio effects, seem more suited for this type of project. They are more imaginative and fun. The simpler, original effects stylistically complement the personality of the project.

As with the animation, file size is a consideration when planning sound for the movie. WAV files are a standard for digital audio and just recently Flash added the import feature for MP3 files, a file format that delivers high quality sound with efficient compression. A combination of these two formats was chosen for this project.

All audio files were created as WAV files using Cool Edit software, making it easy to modify amp settings and eliminate excess breathing sounds and lengthy pauses. Working with young children as narrators required some tweaking at this stage. Initially, the edited files were converted to MP3 files and imported into Flash, but because of problems such as tinny, echo sound quality, this process was scratched. The WAV files were imported directly into Flash, which is made possible on the Macintosh by loading Quick Time 5.0 on your machine. Importing WAV files into Flash on the PC is not a problem with or without Quick Time. The Macintosh is still my preferred platform. To get around the large file sizes that a WAV file generally creates, Flash exports them with MP3 compression. In the “publish settings” feature of Flash, which offers options for exporting movies, MP3 compression with 32 kbps and best quality were selected. This created good sound quality without significantly enlarging the file sizes in comparison to the MP3 imported files.

## INTERACTIVITY

In creating the game portion of the Character Critters Storytime CD, careful consideration was given to producing a game that would reinforce the educational message of each story. Roy the Responsible Rabbit learns to be responsible by taking care of a carrot patch. In the game, the child is invited to help Roy pick the carrots by clicking on the carrot tops. Once the carrot tops are clicked, the child is treated to carrots jumping around the scene, and encouraging phrases praise the child (Figure 4).

Flash's motion and sound environment is very intuitive and is similar to the combination of the A/B roll process in film editing and the concept of layers in Photoshop. Flash is structured around layers on a timeline, with each layer including a different element. The interactive part of Flash is much more complex.



FIGURE 4. Scene from Roy the Responsible Rabbit game

Each story in the Character Critters CD is interactive in the sense that the viewer can leave the story at any time, change to a new story or play a game. This is accomplished with

buttons and actionscripting. Actionscripting is Flash's version of javascript, a computer language that allows a programmer to develop action or interactivity within a website or, in this case, a multimedia CD.

Each button in the story is assigned a look that tells the viewer when the button is up, down, the mouse is over it or it has been hit. A sound clip is included in each button to give the viewer an audio prompt of the option available. This is especially important for young children who may not know how to read. Once a button is clicked, the actionscript will tell the scene to stop, to move to and play a different spot of the scene or go to another movie. In the reality of actionscript, the viewer doesn't go to another movie, but rather a new movie is loaded into the scene.

The Character Critters Storytime games are created using actionscript in conjunction with other movies. A movie in Flash can refer to the main movie or scene being viewed, a separate animated sequence, or a single object with no animation, placed in a movie. As an example of the way actionscript works, Cindy the Citizen Crab is created with one background scene, a separate movie clip of Cindy moving, a movie clip of each of the pieces of trash, the garbage can and a hidden target box inside the trash. The game also includes three separate movies of the stars that are loaded into the scene from outside the game when prompted by an action of the viewer.

When a child drags a piece of trash into the trash can and it collides with the hidden target box, an actionscript tells the scene to load one of the three stars movies from outside the scene. The stars are loaded over the trash can, inside the game scene, and the animated star sequence plays, then stops. Audio is included in the stars movie and praises the child for doing a good job.

## COLLATERAL MATERIALS

When you have a bag of jelly beans, you don't put them in a plain brown wrapper. You have to show them off and let your audience know what kind of treats are waiting for them inside. The label and package are also integral parts of delivering the content to young children. It needs to be wrapped up like a present.

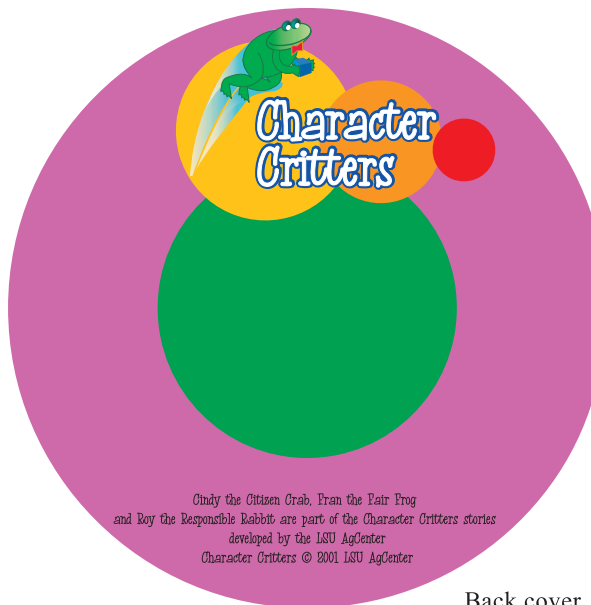
In designing the packaging and label, I wanted the same bright, fun style of the CD to be projected. The first design solution was to have a CD with a label inside a jewel case and let the label be the imaging for the package. But it was not enough to put the CD in a jewel case with a colorful label. The package needed to be unexpected, like a surprise. My solution was to have one of the critters be the package and, in a sense, deliver it to the child. Fran the Fair Frog was chosen to hold the CD in her hands as if giving it to the child like a gift from the critters. The CD with the label, that also reflects the same stylistic choices made throughout the project (Figure 5), is placed in the hands of Fran. It is printed on a cardstock and becomes the backing for the package.

Included in the packaging is a booklet designed to introduce Character Critters to parents and teachers and to provide instruction for using the CD. The problem was how to include the brochure in a nontraditional package. Initially the booklet was designed as a square like those that slip into the cover of jewel cases, but once the shape of the packaging changed this was no longer an option. This problem was solved by making it round and placing it between the CD and Fran the Fair Frog backing (Figure 6). All the pieces are intended to be vacuum-packed into place. The package is hole-punched at the top and hung from a rack (Figure7).





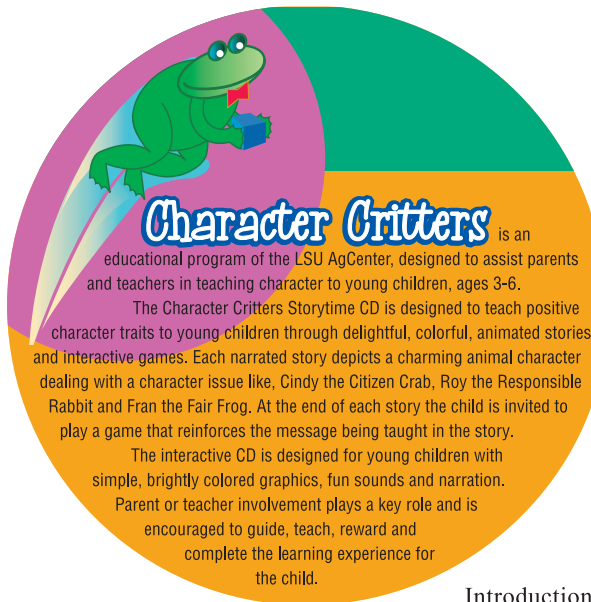
FIGURE 5. Character Critters Storytime CD label.



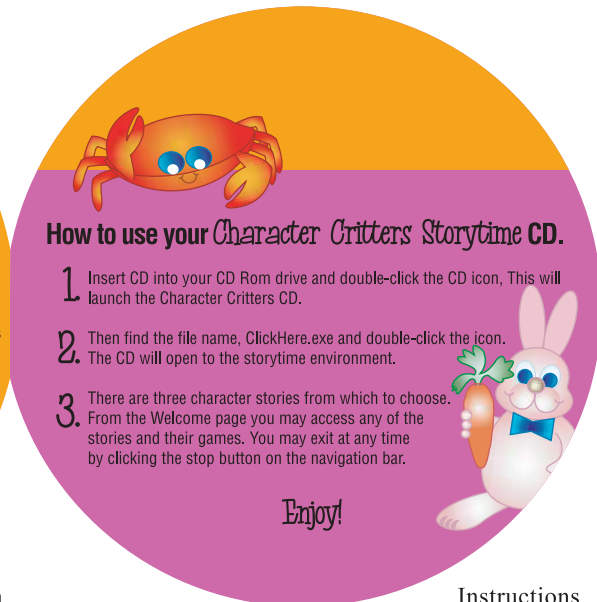
Back cover



Front cover



Introduction



Instructions

FIGURE 6. Character Critters Storytime instructional manual.



FIGURE 7. Character Critters CD packaging.

## SOFTWARE

Macromedia Flash is the main software used for the Character Critters Storytime CD. Flash is a multimedia program used for creating interactive content, primarily for the Internet. In the case of this thesis project, Flash was a more than adequate stand-in for other high-end multimedia programs like Director/Shockwave. Flash's animation, audio capabilities and actionscripting provided all the tools necessary for the interactive CD.

Adobe Illustrator is my program of choice for illustration. It was used to create all the vector graphics for the images in this project. Importing these images into Flash produces some unreliable color results, but those problems are manageable. I have been told that Macromedia's illustration software, Freehand, is more compatible with Flash, but Illustrator is a far superior program in my opinion and worth the inconvenience. Maybe someday soon Flash will get its illustration act together.

Cool Edit software by Syntillium was used for recording and editing audio files. Because I am a graphic designer, the audio portion of the project was somewhat foreign to me, but Cool Edit is a very simple program to learn and gave me all the flexibility I needed.

## CONCLUSION

Throughout the project I have been aware of how things that seem contradictory on the surface somehow blend and become parallel once you are able to understand their basic truths. The idea of the intuitive, artistic side and the analytical, technological side of this project began to become incorporated early. As an artist and graphic designer, I found the technological portion, such as scripting for game interactivity, more difficult. However, once I began to peel away the layers and break it down into its simplest form, I began to understand the language. The ying and yang nature of these two aspects of the project, art and technology, began to complement each other and work together to create a project that accomplishes its mission.

Earlier in this document I mention that you must be able to see beyond the surface of a thing, break it down to its essential parts and see how the elements work together to create the whole. Clearly seeing the project and understanding its parts, the art and the technology became a critical part of the process. It was only then that the two seemingly different factors began to merge. When that happened, it was like magic!

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## APPENDIX



March 25, 2002

To Whom It May Concern,

This letter serves as permission for Elma Sue McCallum to use the LSU AgCenter's Character Critters material in her Masters thesis project. Character Critters stories, *Fran the Fair Frog*, *Fran and Freddie Clean Up*, *Roy the Responsible*, *Roy and the Carrot Seeds* and *Cindy the Citizen Crab*, *Cindy's Visit to the Police Station* are copyrighted by the LSU AgCenter.

Sincerely,  
  
Frankie Gould  
Director and Head  
Communications and Public Relations

**OFFICE OF THE CHANCELLOR**  
101 J. Norman Efferson Hall - LSU  
Baton Rouge, Louisiana 70803  
Post Office Box 25203  
Baton Rouge, Louisiana 70894-5203  
(225)578-4161  
Fax: (225)578-4143  
Web site: www.lsuagcenter.com

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Baton Rouge, Louisiana 70894-5100  
(225)578-6395  
(225)578-7569

Communications  
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Baton Rouge, Louisiana 70803  
Post Office Box 25100  
Baton Rouge, Louisiana 70894-5100  
(225)578-2263  
Fax: (225)578-4524

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and Organization Development  
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Baton Rouge, Louisiana 70803  
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Baton Rouge, Louisiana 70894-5100  
(225)578-6194  
(225)578-2478

International Programs  
118 Knapp Hall - LSU  
Baton Rouge, Louisiana 70803  
Post Office Box 16090  
Baton Rouge, Louisiana 70893  
(225)578-6963  
Fax: (225)578-6775

## VITA

Elma Sue McCallum was born in Covington, Louisiana, in 1954 and grew up in Baton Rouge. She was graduated from Louisiana State University in 1977 with a Bachelor of Fine Arts degree, major area of concentration, painting.

She pursued a career as a graphic designer and with a Baton Rouge advertising agency where she worked with various commercial, industrial and political clients. In 1983 she began her own business, McCallum Design. She has received local and regional awards for her design and illustration work.

In 1997 she began working in Communications with the LSU AgCenter. She enrolled in the Master of Arts program in Liberal Arts at Louisiana State University and will receive her degree in May 2002.



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