Multimedia in Education

The strength of multimedia-based educational tools lies in their ability to do things that books and other traditional media and methods can not do. Define multimedia as any computer program that includes written text, pictures, moving content (animation and/or video), and sound. In addition, multimedia products are usually interactive, that is they allow the user a measure of control over the lesson by providing buttons and other controls. Furthermore, an interactive product will often furnish immediate feedback based on the user's actions. Multimedia can therefore engage a student on more levels than a traditional text book; instead of passively reading and absorbing data, interactive media allow students to make decisions, to integrate various strands of data, and to synthesize information. Since multimedia programs are not limited to one style of information delivery—like a book, lecture, or slide show—they can better serve a variety of learning styles: auditory, visual, and kinesthetic.

Studies published over the last decade have begun to show that multimedia products can have a very real and measurable impact on learning. In a 2006 paper published in Educational Media International, Weks, Kramerski, and Talis reported on a study conducted in Israel that found that the use of a multimedia lesson significantly improved mathematical achievement among kindergarten children (Weks, Kramerski, & Talis, 2005). Siegers and Verhagen (2002) and Immonen et al. (2002) in Finland, where multimedia was used for literacy education and phonological awareness with kindergarteners, found that multimedia was superior to traditional methods. In both cases the general consensus is that proper use of multimedia and interactivity can lead to improved learning.

So what constitutes proper use? As far back as 1992, Poelt & Hopkins took it upon themselves to sift through all of the literature and put together a set of guidelines for the use of “dynamic visual display,” that is the proper use of animation, sound and video. They proposed six conditions under which dynamic display was appropriate: 1) demonstrating sequential actions in a given task; 2) animating complex systems or processes; 3) explaining otherwise invisible systems or functions; 4) showing visually a task that is hard to explain verbally; 5) providing a visual analogy for an abstract concept; and 6) focusing attention on the relevant features of a visual display.

And there is also the “fun” factor. Many designers and educational theorists believe that interactive tools will be successful if they can make learning fun for the students who enjoy a particular program are more likely to use it longer and more frequently. Given that students these days are immersed in a culture dominated by television, video games, computers, and other multimedia devices, it makes sense to employ the same technology for educational purposes.

The Project

My goals for this project were ambitious: I desired that the final product would: 1) contain visuals that would be aesthetically appealing; 2) have a narrative that would be compelling and hold the interest of the viewer; 3) make extensive use of multimedia elements such as animation, sound and interactivity; 4) be scientifically accurate, 5) be useful to teachers, 6) be fun for the user, and would inspire repeated uses.

My solution, Ellie’s Tadpoles, is an interactive story book that tells the story of a girl Ellie, who finds some tadpoles and raise them until they become frogs. In addition to the pictures and words, there are activities and games, designed to engage the user and to provide information on the subject of metamorphosis, specifically the metamorphosis of frogs and toads. The target audience for the project is grade school children, primarily between the ages of seven and ten, for it is at that age that children begin to think about metamorphosis in school. Ellie’s Tadpoles was envisioned to be both a tool that teachers could use in the classroom as part of a larger metamorphosis curriculum, and a stand-alone piece that children could replay on their own school or at home via the Internet. In addition, the protagonist of the story is a girl, in a conscious attempt to create a product that would appeal to females, given that many published reports bemoan the lack of women participating in the sciences.

Ellie’s Tadpoles was built around a narrative, much like a traditional children’s book. In the story the users are introduced to Ellie and her family, who live in the country. One day Ellie and her father find a pond inhabited by a variety of animals, including tadpoles. Ellie is quite fascinated by the tadpoles which inspires her father to suggest that they take some home and raise them. After a trip to the library to do some research, Ellie and her father return to pond, catch several tadpoles, and bring them home where they watch their development. In the process, Ellie learns all about amphibians and metamorphosis.

But what sets Ellie’s Tadpoles apart from traditional printed books is the fact that it is an interactive computer program. As such it contains sounds, animations, and interactive games and activities. The users are more than passive observers, they become active participants. When Ellie and her father reach the pond, the user can move her mouse over the scene and spot animals. In the library, the user helps Ellie find books that might contain information about tadpoles. The user plays a game in which she tries to catch several tadpoles and place them in a jar. The user also participates in the set-up of the aquarium that serves as the frog habitat. She must fill it with water, add the water conditioner and other elements that the tadpoles need, and finally the tadpoles themselves. Interactive screens also illustrate the process of metamorphosis—the time lapse animations show a tadpole becoming a frog, divided into four main stages. And an interactive quiz makes the user try to identify the discovered frogs once they have reached maturity.

The Process

Ellie’s Tadpoles began as a simple concept: a little girl raises tadpoles. This was then developed and turned into a full length story. Next was the creation of a set of storyboards, used to plot the plot and visualize the various scenes. During the storyboarding process, many of the game and activities were conceived and placed into the narrative in the appropriate places.

After the storyboards were finished, work began on the final art. The illustrations were created using pen and ink, watercolor, and color pencil on watercolor paper. These were then scanned and brought into Photoshop where the images were retouched, slightly scaled and saved. Many of the screens in Ellie’s Tadpoles contain animation; these were created as separate paintings that were later combined digitally in the animation program Flash.

The illustrations, now digital, png files, were brought into Adobe Flash, where the actual interactive program was assembled. Flash allows for the creation of animations and user controls such as buttons, and drag and drop objects, through the use of a native coding language known as Actionscript. The finished project was then exported as a .swf file, which can be embedded into a Web page, or used as a stand-alone product.

Ellie’s Tadpoles was not yet complete. Once the program was working, it underwent a series of user tests. Teachers and some children were turned lose on the program to see what they thought. In the process, bugs were found, minor weaknesses discovered, and suggestions were made. But on the whole, Ellie’s Tadpoles proved to be a great success. The teachers that were shown the piece were unanimous in their belief that the program would be an asset to classroom instruction. The children that used it were clearly engaged and excited by the program and many asked to use it multiple times.

Ellie’s Tadpoles can be viewed (and used) at http://www.danfergusdesign.com/thesis.

References