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Arts and Sciences in candidacy for the Computer Graphics
Design degree of Master of Fine Arts

SwimSmart

An interactive and instructional multimedia application

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Abstract

The thesis project, SwimSmart, created by Rebecca Natalie Berent, is an instructional CD-ROM designed for coaches and intermediate to advanced swimmers seeking to improve upon their swimming skills. It is designed for use on both a projector for group training and on a personal computer as an individual teaching aid, and it runs by inserting it into a computer. The CD includes videos depicting proper swimming technique and is organized within a graphical interface broken down by stroke technique, coach advice, and tips, exercises, and downloadable practice routines. There are two additional sections devoted to credits and an explanation of the application, and a library where the user can watch all videos found throughout SwimSmart in one place. The program is interactive, meaning the user uses the mouse to click through and view various types of content related to swimming.

Teachers and professors typically use some form of multimedia to assist in instructing students in the classroom. The intent of SwimSmart is to improve upon a physical activity using the same principles behind the instructional multimedia used in classrooms. The physical skill is depicted by video that captures the actual movements of a swimmer, along with demonstrations of exercises, practices, and drills. These demonstrations are explained in terms of the muscles they affect as well as how they will improve personal swimming skills, times, and strokes. There are also sections devoted to common mistakes swimmers tend to make and how to correct them.

For the creation, design, and implementation of SwimSmart, videos were shot, edited, and made into short, stand-alone clips, which were then combined and organized into a structured format within the SwimSmart application. Each clip is devoted to an area of swimming and is set up like a short documentary of the particular topic or subject.

Video content includes coaches giving advice and explanations of strokes, swimmers in the pool demonstrating various aspects of swimming, and dry-land training.

The designer shot and edited video of coaches and swimmers and created videos to teach the principles of swimming and the various strokes and to present drills, exercises, and other content. All the videos were combined into a dynamically generated video player embedded within a graphical interface using ActionScript and XML code and Adobe Flash. Adobe Photoshop, Adobe Illustrator, Adobe After Effects, Adobe SoundBooth, Adobe Premiere, and Adobe InDesign were all used to create elements for the application, including its brand, video and user-interfaces, buttons, photos, imagery, icons, and more.

Positive usability testing showed that the application was easy to use and understand, well organized and designed, and educational. Additional materials that accompany the CD are CD labels, a user guide, and posters marketing the product.

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Introduction

Problem Statement

Instructional multimedia is used in classrooms all the time to assist teachers in instructing their students on different subjects. The goal of SwimSmart is to show that the same approach can be applied to using instructional multimedia to improve upon a physical skill. The application is designed to encourage learning and improvement in swimming among intermediate to advanced swimmers aged 12 – 18, and/or their coaches, through a packaged interface including video, imagery, text, and other multimedia elements.

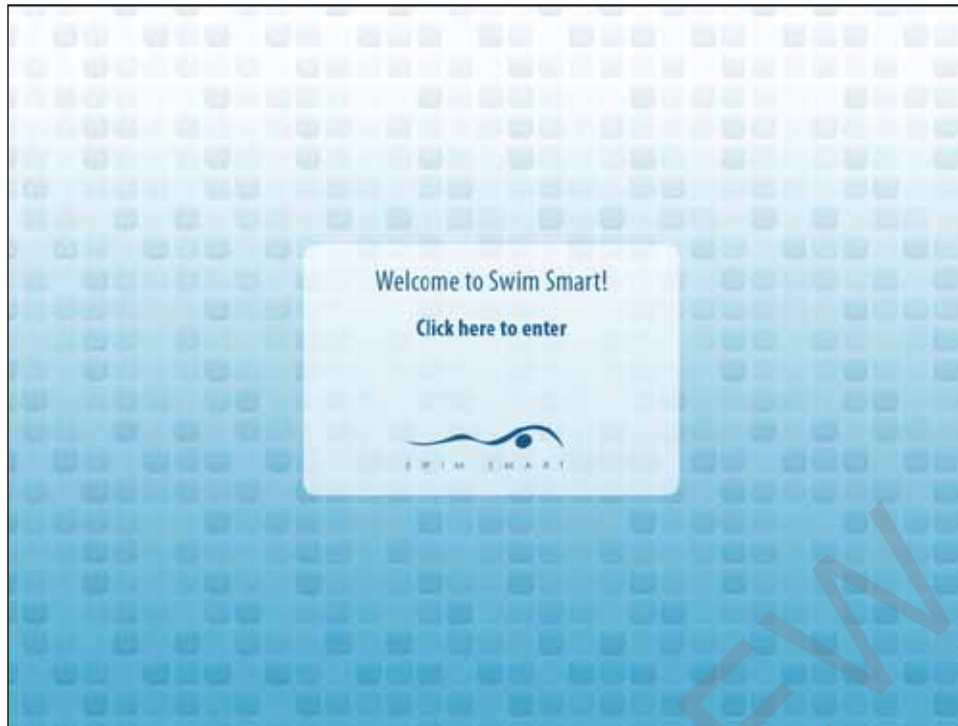
Perfecting a sport, like any other repetitive activity, requires practice, encouragement, and assistance. With so many people using computer software to aid in individualized instruction and classroom learning, I was curious about how much multimedia I could put together into one “shell” to most effectively teach, or facilitate improvement in, a physical activity. Because swimming has always been a favorite sport of mine and I was a member of various swim teams growing up, swimming seemed an excellent fit for the project.

Background Information

Swimming is both an individual sport in which you compete against yourself to increase your best time, etc., and a team sport in which you compete against your own teammates and other teams. Your skills are yours only, and you do your part as an individual in meets and races in order for your team to win based on technique and speed. Because of this, coaches often cannot address every single problem each swimmer might have, and often poor techniques are missed or not corrected, sometimes because the swimmer might be fast but employ improper techniques. Thinking about the instruction that not only I, but other swimmers lacked in terms of training, I thought about which kind of instruction was the most

effective in helping me to learn how to swim, and I did a lot of research on how others learn to swim. I shot video that showed real swimmers doing drills, strokes, starts, and turns so that I could effectively communicate those actions for others to adopt in learning how to swim more effectively. A point that is stressed in the program is that watching videos to improve upon stroke technique is great, but video-taping yourself is even better because then you can see exactly how your body moves as you seek the “correct” or “proper” methods and techniques.

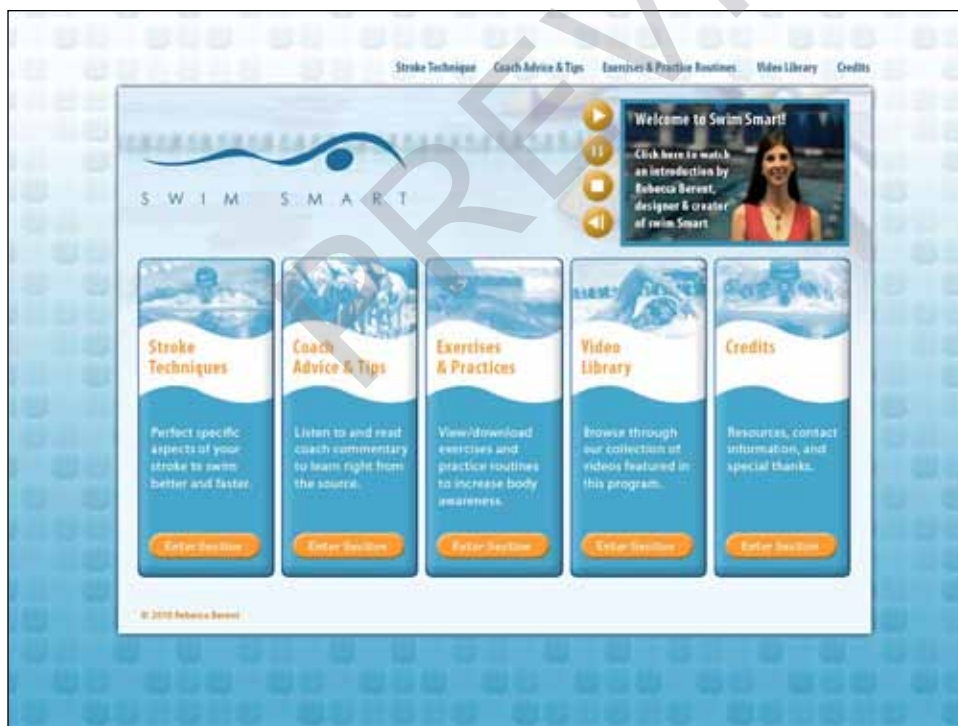
Although there are DVDs and videos out there that are designed for swimming training, there are no stand-alone products, websites, or DVDs that address all areas of swimming in one place. That is, there are none that provide a variety of means to access the information through media like video, audio, photos, text, animations, and other audio-visual content. Available DVDs and videos are typically extremely in-depth, with one stroke or technique covered per volume. This means an individual must purchase multiple volumes in order to address problems with each stroke and even more volumes to help with turning, starting, breathing, etc. There are also, for free, several-minute-long Youtube.com videos that address specific areas of swimming, but these are stand-alone short video clips that each needs to be sought out separately. As noted before, SwimSmart differs from these other sources because of its comprehensive structure and organization, as well as its multimedia format and interactivity for understanding and learning the content.



Introduction Screen

This is a screenshot of the intro screen that users see when the SwimSmart CD is inserted in a computer. Clicking enter launches the screen below.

The purpose of having this initial screen is to introduce the application with its name and logo, and to indicate to users that the application involves user interactivity (clicks).



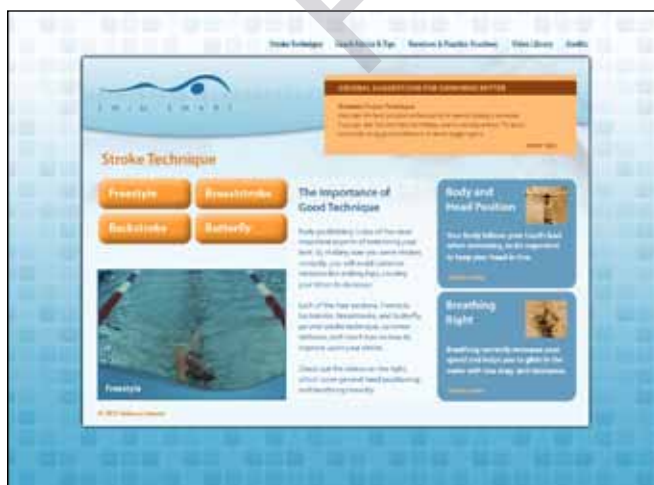
Main Menu

This is the main menu to the SwimSmart application where users can click on the particular section they are interested in. There is also a video introducing the user to the program and how to use it. The video is set up with user controls. Buttons are available to click on to navigate to each section, and again as smaller links at the top of the interface.

Application Overview

All elements in the SwimSmart application were designed using Adobe Photoshop, Illustrator, After Effects, InDesign, and Premiere, and coded using Adobe Flash and ActionScript. Video was shot using a Canon XF300 and a tripod, and the shoots included coach interviews, coach advice and stroke overview and technique, swimmers performing each stroke and subject area covered, dry land training exercises, and scripted voice-overs based on book and Internet research. SwimSmart was created to teach and enhance swimmers' knowledge and proficiency in the sport of swimming, organizing content in a clear and relatable way for swimmers to understand. The final product is a multimedia application combining text, audio, visuals, and video in an interactive fashion.

SwimSmart opens to an intro screen with simple branding and one link to enter into the program. The purpose of the screen is to prepare users for what they are about to enter by providing the logo and name of the application. Once in the application, the user is directed to the main menu page, which includes a brief video introduction by me, and five options for navigating throughout the program. The five sections are "Stroke Techniques", "Coach Advice and Tips", "Exercises and Practices", "Video Library", and "Credits".



Stroke Technique Section

This is a screenshot of the "Stroke Technique" section where users can read an overview of the content available, watch specific videos targeting common problem areas, read short, text tips that scroll at the top of the page, watch a looping video of swimmers performing the various strokes in the water, or navigate further into the program by choosing one of the four stroke sections (Freestyle, Backstroke, Breaststroke, Butterfly).

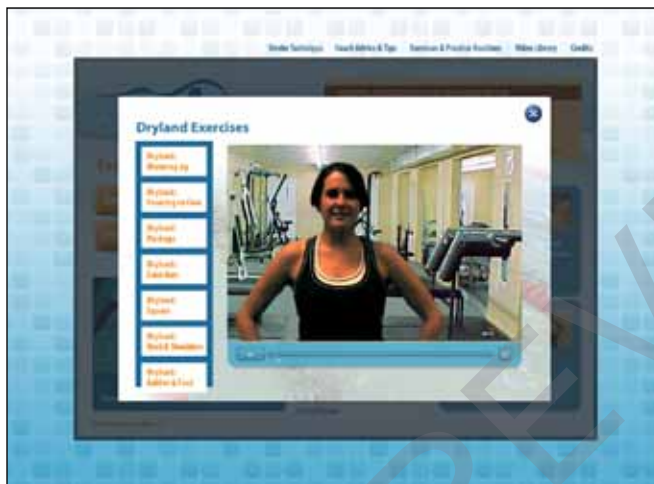
All main sections operate the same way as "Stroke Techniques" in that there is a blurb of introductory text, scrolling textual tips, buttons to sub-sections, and videos available to watch.



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Video Player Example

Each time a user clicks to view a video clip, a new window animates in and the rest of the interface (the background) darkens. Depending on which video the user clicks, an XML file is loaded into the player and thumbnails, as well as the video player, with controls, is loaded. The user can then watch the video they chose, and/or scroll through the list of various related videos on the left, shown as thumbnails with the video's title.



Video Tip Example

In each of the stroke sections, there are tips devoted to just that particular stroke, in short, 10-30 second long clips. These tips are dynamically loaded into a similar video player as the one above, but in a much smaller format, with the controls and thumbnails immediately appearing on the screen without the user having to launch another window. The title of each tip is displayed to the right of the video player, and the user can switch quickly between the different tips offered.

Content Outline

Based on book and online research, I wrote scripts for audio voiceovers in several sections of the SwimSmart application. For coach interviews and advice, I provided the coaches with outlines of what I was going to be asking them to describe or explain, and asked them to speak freely about the subject areas they were most familiar with, and answer honestly to those they weren't. I found that all coaches were very competent in all areas of swimming, and although I followed my outlines in terms of the questions or topics I asked them to cover, they clearly knew the subject matter better than I did and were able to give me a lot of the crucial, opinion-based coach advice I was seeking.

When shooting the coach interviews, I asked the coaches open-ended questions about their backgrounds and how they got started in the sport of swimming. This part went the smoothest because my talent was able to speak freely and openly about themselves, and their personal history in the sport of swimming. These are especially powerful clips because both coaches who spoke on the CD relayed positive messages of encouragement and admitted to struggling in the sport themselves when they were young. They both gave advice on how you can cope with the stress of being on multiple swim teams, having early or multiple practices a day, getting injured, being the best you can, and dealing with difficult people in the sport, as well as other important information that swimmers using SwimSmart will be able to relate to, and hopefully learn from.

For the dry land portion of the training, I wrote a description of each exercise that needed to be demonstrated, and asked my fitness model, Jessica Dinaburg, to explain the exercise while performing it on video. Initially it was hard to get good audio levels of Jessica because she was moving while speaking. After several attempts I also found that it was difficult for her to remember everything she wanted to say while she demonstrated. After running into these problems, I had her perform all the exercises without speaking, and afterwards we went into a sound booth located in the Computer Graphics Design lab, and recorded the audio to combine with the video clips. This worked very well and during the editing process I was able to extend some of the exercises based on the audio in order to most effectively convey proper technique.

When filming the swimmers in the water, I provided each one with an overview of what I'd be having them swim (based on previous conversations with them regarding their best strokes) and had them begin by warming up in their preferred manner. I filmed everything. I wanted to be sure that I not only got footage of what I planned to get (each stroke, certain drills, turns, starts, etc.) but also each swimmer's own technique and routine for warm-ups, warm-downs, and even just downtime in the water (for example, I filmed one swimmer treading water and another floating on her back for her warm-down, which I added as an additional clip without initially planning on it.) The swimmers' shoots went okay, in terms of the talent and strength of the swimmers' strokes. However, I wasn't able to be as creative as I'd hoped in terms of the video angles because of the limiting environment at a swimming pool (especially indoors in the winter), and the restrictions I had regarding having only my swimmers in the frame, and no one else. I would have liked to have gotten some shots from above, or shots from an angle where some aspects of the stroke or drill could have been clearer, but even though I tried different techniques at each shoot, I was not able to do so. However, with the coach video/audio combination, the video clips of swimmers are explained in depth by both the

swimmers and the coaches describing the techniques. In the future, I would certainly like to shoot again, in a different environment, during a different season, and with a camera and tripod that would allow for various creative angles.

I wrote the text accompanying each section from my previous knowledge of the sport, research in books, and online, and research from the interviews and advice from all the coaches I talked to, not just the two featured in the application. The bulk of the application is video, but I wanted to include some text to explain the sections, give brief overviews of each stroke (Freestyle, Breaststroke, Backstroke, Butterfly) and drill, and give instructions for user interaction. The textual aspects are intended to strengthen and add to the rich video content. I also wrote text for the downloadable practice routines based on input from the coaches involved, as well as from several online resources for routine suggestions and best practices.

Survey of Literature

Swimming Books

The Triathlete's Training Bible

by Joe Friel

VeloPress; Third Edition, February 2009

This book is not just intended for swimming, as it says in the title, but it is still a great guide for setting yourself up for regular workouts, preparing for swim meets and other races, and learning basic technique for swimming as fast as you possibly can. Because this book is intended for people who are competing in a triathlon (or the like), it is a great resource for improving speed. Although stroke technique is emphasized less, streamlining, and other important tricks to going faster in the water are covered, as well as how to train, what to eat, how to improve body composition, breathing techniques, and more.

Complete Conditioning for Swimming

by David Salo

Human Kinetics, June 2008

This book contains everything an advanced swimmer or coach needs to know in perfecting a swimmer's technique. From warming up, tailoring strokes, to diving, starting, flip-turns and cool-down, there is a wealth of information here. Because the book is written for an already experienced swimmer, it is similar to the way content should be presented in SwimSmart.

Fitness Swimming

by Emmett Hines

Human Kinetics, June 2008

This book starts from the ground up in terms of learning to swim but it moves quickly and covers all areas of swimming, from the beginner to the advanced. This book provides workouts that are broken down by the goal of the training. There is speed training, strength training, stroke enhancement, etc. A lot of the content here will be useful for the workout and training sections of SwimSmart.

Total Immersion: The Revolutionary Way To Swim Better, Faster, and Easier

by Terry Laughlin

Fireside, January 2004

This book demonstrates how to perfect swim performance and shows the correct body positions to enhance stroke technique. The book includes drills that help swimmers strengthen their bodies correctly – both in and out of the water – along with visuals that help in perfecting strokes. This will be an important contributor to my project for both the actual content, but also for the special tips that will pop up throughout. This book will be especially helpful because it offers alternatives to the traditional way of learning to swim, encouraging technique over speed. Although this can be seen as being counter productive, it generally leads to more experienced swimmers in the long run.

The Fit Swimmer: 120 Workouts & Training Tips

by Marianne Brems

Human Kinetics, October 1994

This book gives a very detailed explanation of how to coach swimmers. It is filled with tips and techniques for improving skill. There are also important sections that explain how to teach or correct certain common problems swimmers encounter. This ranges from lazy ankles, to wrong breathing methods, and more. This book is aimed towards swim coaches and teachers. I will use this book to learn more details about competitive swimming, along with ideas for pop-up tips in my application.

The Swimming Drill Book

by Ruben Guzman

Human Kinetics, November 2006

This book contains multiple drills for each stroke (Freestyle, Backstroke, Breaststroke, Butterfly) in a comprehensive fashion with photos. Most of the captions site a specific drill and ideas for improvement or encouragement from a coach's standpoint, which is extremely valuable for the swimming tips that pop up throughout SwimSmart. I also used an assortment of the suggested drills to create my practice and exercise routines that are available to download in the exercises section of SwimSmart.

Swimming Contacts

Karl Dobosz,

Brighton JV Swim Coach and swimmer

Karl has been swimming since he was very young and currently still holds 5 top records at his high school where he graduated ten years ago. He is now head swim coach of the boys' team at Brighton High School and has been assistant coaching since college. When he was younger, he had the best stroke technique in the district and was regarded as one of the fastest swimmers in his age range. He will be the source of a lot of information, as well as providing insight as both a swimmer and a coach.

Mike Cahill

RIT Swim Coach

Mike is the head Swim Coach at RIT and through several in-person and video-taped interviews will provide valuable information and content for the SwimSmart application.

Chrystal Marcotte

Swimmer, coach

Chrystal has been swimming since she was very young, and she will be the swimmer focused on for the bulk of the video content. She is an excellent, strong, and powerful swimmer with incredible technique. She works out regularly and is able to not only demonstrate swimming, but will help with the dryland portion of the application as well. She will also provide insight into improvement for swimmers using the application.

Sarah Kimball

Swimmer

Sarah has been swimming since she was a young child and swam on various swim teams growing up. Her best strokes are Freestyle and Backstroke, so I plan to use her to focus on those two strokes specifically.

Elizabeth Whicter

Coach/Swimmer

Elizabeth has been coaching swimmers aged 8-13 for the past five years. She knows a lot about instructing younger swimmers and understands how they learn. She is also a strong swimmer herself. Her best stroke is Butterfly, a stroke many swimmers have trouble perfecting. I plan to use Elizabeth for most of the butterfly drills. She will be an important source of information for how swimmers learn as well as explaining the best ways to correct stroke technique in younger swimmers.

Kristen Curtze

Coach/Swimmer

Kristen is on the RIT Swim team and has been swimming since she was very young. She also coaches middle-school swimming and she can provide valuable insight into how young swimmers respond most effectively to a particular coaching style. She may also swim for the swimming section of the application.

Jessica Dinaburg

Fitness Model

Jessica, who has swum competitively in the past, is passionate about fitness and exercise.

Aside from knowing a lot about proper technique in terms of general (dryland) workouts, she also is a confident and outgoing model who will best be able to guide the user through doing the dryland routines, as well as possibly introducing other areas of SwimSmart.

PREVIEW

Swimming Websites/Electronic Materials

Swimming on About.com, 2009

Mat Luebbbers (and guest writers)

<http://swimming.about.com/>

September 19, 2009

This is an all-inclusive section of about.com that explores the sport of swimming.

The intended audience for this content is swimmers, coaches, and anyone who wishes to learn or improve their swimming and can read and follow directions online. Among the many topics covered on this site, one can learn about stretching, turning, all different stroke techniques, breathing, medleys, practices, common swimming problems, coach direction, and more. This is a resource I will use in developing the content for the DVD.

Swimming on WonderHowTo.com, 2009

<http://www.wonderhowto.com/how-to/video/how-to-do-hand-technique-drills-to-improve-swim-stroke-skills-251986/>

September 20, 2009

Similar to About.com in that it is a site where many topics are addressed, WonderHowTo.com has a section devoted to swimming. Different from About.com, however, this site has video tutorials that teach the topic of interest. This site is aimed at any age group that desires to learn to swim or become better because reading is not required to learn and view the content. This is going to be a very valuable site for me in the future so I can learn the best technique for teaching and enhancing skill technique through video. I plan to study the angles of which scenes are shot, in combination with other video references, to determine some of the most creative angles used by those who film swimmers.

Swimming on Learn4Good.com, 2008

Learn4Good Net

http://www.learn4good.com/howto/learning_to_swim.htm

September 19, 2009

Another site about various topics has a great section on swimming. This site breaks down the strokes – teaching technique on how to do each individual stroke and get the most out of it. The most interesting part of the site is the way it breaks down movement into leg and arm movement, and explains in detail when each series of movements should occur. This information will be valid in the content of the DVD.

Swimming on Sportvideos.com, 2004

<http://www.sportvideos.com/products.asp?catID=92>

September 19, 2009

This site provides instructional DVDs for learning to swim. Although I am not able to preview the content on the DVD, I would like to obtain them so I can learn a possible way I might want to integrate video into my application. Although there are many clips on Youtube, and other sites like it, these are complete DVDs going over every detail of each stroke. I might be able to use these to help with both the way to capture video (angles, lighting, etc.), as well as what areas of swimming are usually covered by competing swimming videos.

Youtube.com

There are numerous videos available for free on Youtube.com that I plan to study for help on video angles and framing subjects when shooting in a pool/water environment.

E-Learning Books, Websites/Electronic Materials

e-Learning by Design

by William Horton

Pfeiffer, July 2006

This book provides guidance for making the best decisions for effective e-learning. It covers how to engage users by providing fun, interactive activities. It also teaches how to create learning games, simulations, tests, and assessments online. This book is targeted towards instructional trainers and educators who want to take learning to the next level. It will likely be helpful to me in making certain decisions about how content should be displayed, taught, presented, covered, etc.

Designing Web-Based Training: How to Teach Anyone Anything Anywhere Anytime

by William Horton

Wiley, February 2000

This book discusses the process for building a multimedia application by considering the different approaches, framework, structure, and processes for various types of learning. The book asserts that it is important to know *how* to teach what you are teaching. There are many different methods for distributing information through e-learning, and depending on which approach is taken, different results will be obtained. The book also contains troubleshooting information for technology hurdles, as well as distribution, pushing boundaries, and more information about creating and implementing cutting edge applications that work the way they're supposed to. The book is aimed towards college and graduate students, as well as people in the industry who want to learn more about the process of creating an effective teaching solution.