

# **Race for the Sky: A History of the Skyscraper in America**

By

Christina Krommer

Submitted to  
the Faculty of the Information Engineering Technology Program  
in Partial Fulfillment of the Requirements for  
the Degree of Bachelor of Science  
in Information Engineering Technology

University of Cincinnati  
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Date

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## **Abstract**

Race for the Sky: A History of the Skyscraper in America is an interactive, Web-based multimedia project designed as a tutorial on the evolution of the skyscraper in the United States. Using Flash and DHTML, the tutorial takes the user through the over 100 year history of the skyscraper with text, images, sounds and video clips. Set up in the same hierarchical format as a book, the tutorial includes four chapters, each being an era in history, pages of information on buildings, and a quiz at the end of each chapter. The Web site is divided into two sides, one being strictly Flash and the other being DHTML, for the purpose of being accessible to people with differing abilities and to accommodate slower internet connections. Overall, the project is an exercise in the use of multimedia projects as a way to disseminate information to a large audience for educational purposes.

# **Race for the Sky: A History of the Skyscraper in America**

## **1. Statement of the Problem**

America has a proud history of development, ingenuity and invention. There has been a tradition of exploring new frontiers, from Lewis and Clark's Expedition to space exploration. It is because of this ingrained sense of adventure that the United States gave the world of architecture a unique contribution: the skyscraper (1). By the time of the industrial revolution in America, the Wild West had been conquered, the cities were becoming a cultural melting pot and overcrowding was quickly becoming an issue. Thanks to the inventions of the Otis Elevator and the steel structure, Americans were able to start building up into the sky (1). The rush for height started and skyscrapers came to define American cityscapes.

Several theories of pedagogy support the observation that there are different styles of learning. A key theory states that there are four main categories that represent the way a student learns (2):

- Visually/verbally by reading information
- Visually/nonverbally by looking at pictures and diagrams
- Aurally/verbally by listening to spoken information
- Physically/kinesthetically by hands-on, interactive experiences

It has been my experience as a student of the School of Architecture and Interior Design at the University of Cincinnati that the methods of teaching architectural history focus on the traditional classroom setting. Students are lectured to by the professor with slides as visual aids and are expected to read the accompanying text. While the lecture reaches the aural/verbal learner, the slides reach the visual/nonverbal and the text reaches

the visual/verbal learner, this method of instruction does not consistently reach all students.

## **2. Description of the Solution**

The multimedia tutorial *Race to the Sky* addresses the problem of meeting the needs of all types of learners in an academic setting and provides an accessible medium through the Web. Multimedia tutorials are “flexible, with multiple pathways for cognition and learning” (4). Within multimedia tutorials, “the modes of learning change from textual to audio, and audio to video, and so forth, as the learner invokes the multimedia objects merely by clicking on links. This provides the flexibility to acquire knowledge from different modes, e.g., auditory, visual, and kinesthetic” (4). Using multimedia tutorials as a way to teach architectural history should consistently reach all students with the same information, regardless of a particular learning style.

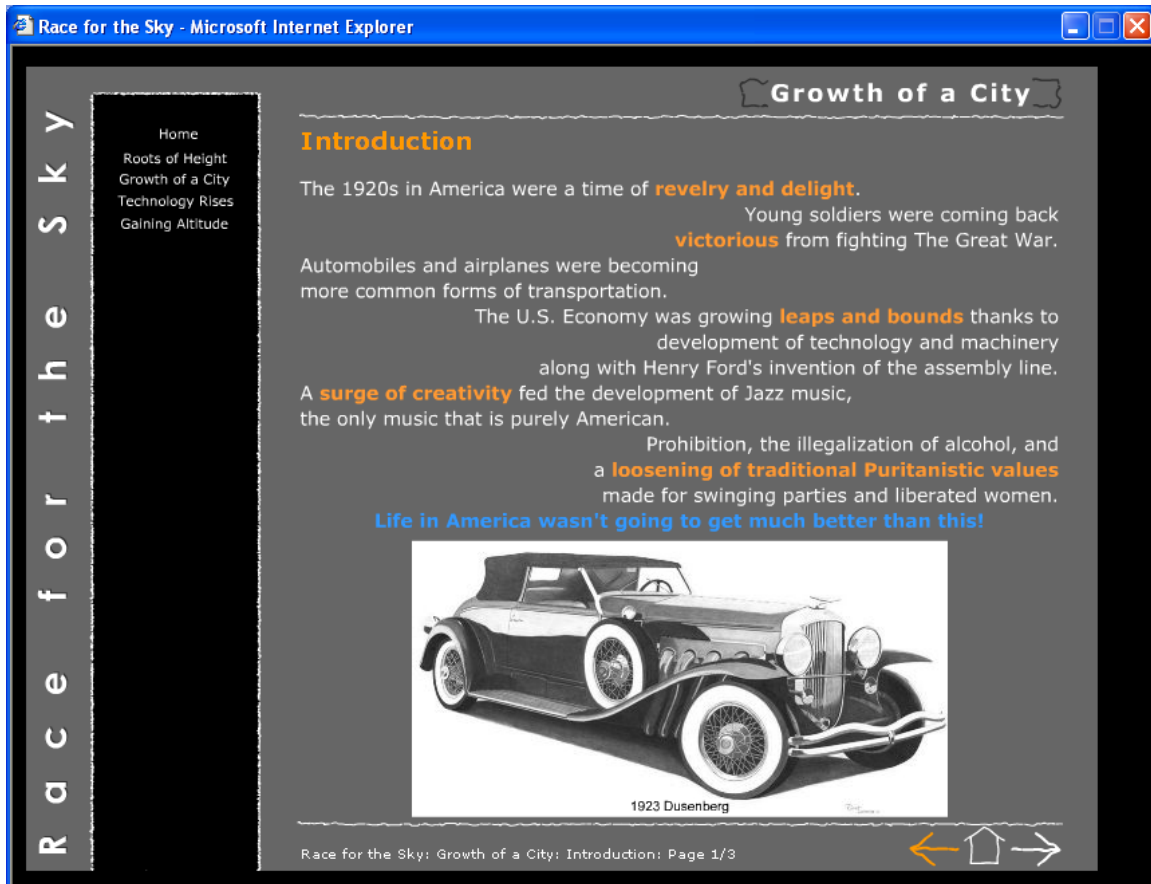
### **2.1 User Profile**

The intended users for this tutorial are college students with an educational interest in this topic and enthusiasts of this building type or architecture in general. They have knowledge of general architecture terms, history, and design styles or are capable of discovering this information on their own. Their information technology literacy does not have to be extensive. They just must be capable of using a mouse, connecting to the Internet, and using Internet Explorer or a similar program. If they wish to view the Flash version of the Web site, they must either have already installed the Flash player or have the ability to install the product.

## **2.2 Design Protocols**

The tutorial follows a hierarchical structure. It is designed in the same logical sequence as a book with chapters and pages. The “book” is the entire tutorial. The “chapters” are topics of study, structured around styles and eras of architecture. The “pages” are sub-topics, including historical/social context for an architectural style, descriptions of the stylistic elements, archetypal buildings relating to that style and quizzes to reinforce what was learned. Appendix A. has a flowchart depicting these relationships. Sound clips, video, and images are included in the pages. These give visual and aural support to the topic under discussion. These multimedia enhancements are images of archetypal buildings, period music, video of construction, and video of period events or movies. It is important that a historical and social context is given to the era being presented because it is often reflected in the architecture. Architects often draw design ideas from current events in order to make their work relevant to the people experiencing it.

The interface and navigation for the project are consistent on both the HTML and Flash versions of the Web site, and can be seen in Figure 1.



**Figure 1. Introduction page with typical interface and navigation**

The tutorial title is vertical and aligned to the left. The main menu is contained in a long black box just to the right of the title. The main menu contains the chapter titles, so users can move from chapter to chapter with ease. The chapter title is aligned to the top of the menu box and is bold and white. Below the chapter title is the page title. It is in orange to give emphasis to what particular topic is the focus for the chapter. The multimedia portions of the page are all aligned to the right and stacked vertically, with titles and graphics where appropriate. A visual mapping of where the learner is in the entire tutorial is placed at the bottom; it is in smaller text so as to not be detracting from the rest

of the page. Finally, the two arrows in the bottom right hand corner of the page are for forward and backward navigation through the pages. These features have all been designed consistently to make the intended users comfortable with their placement and to make the tutorial easy to use.

Along with the graphic layout of the tutorial, the icons, graphics, fonts and colors have all been made consistent. The arrow icons are visually consistent, including their color change from white to orange with a rollover event. Currently, all fonts are Verdana, with variations of weights, spacing and color for emphasis. All images that act as icons within the tutorial are in grayscale, with the exception of some movie clips which may be color. The color scheme is a black HTML background, with a 50% gray tutorial background, white and dark gray accents, and orange and blue for emphasis. The majority of text is white on gray for contrast and easier reading.

### **3. Deliverables**

In order to develop a user friendly and competent project, during the design phase the following deliverables were developed:

- An option for the user to view the site in either HTML or Flash
- A splash screen to introduce the user to the site
- Multimedia elements to enhance the user's understanding of the material being presented
- Quizzes at the end of each chapter to reinforce the information in the chapter
- A graphic preloader to show the progress of the main Flash movie or the chapters being loaded into the user's computer memory.

## 4. Design and Development

### 4.1 Budget

The budget reflects retail prices of the software and hardware. The hardware costs were incurred before the conception of the project and adequate for the completion of the project.

<b>BUDGET</b>		
<b>Product</b>	<b>Price</b>	<b>Quoted From</b>
Macromedia Flash MX	\$ 499.00	www.macromedia.com
Macromedia Dreamweaver MX	399.00	www.macromedia.com
Adobe Photoshop	609.00	www.adobe.com
Adobe Premier	549.00	www.adobe.com
Goldwave Digital Audio Editor	40.00	www.goldwave.com
HP Pavilion Desktop 734n: 2.0 GHz processor, 512 MB SDRAM, 80 GB Hard Drive, Windows XP, NVIDIA® GeForce4™ MX420 graphics card with 64MB DDR SDRAM video memory w/ TV out, Integrated AC-97 sound card	799.99	www.hpshopping.com
<b>TOTAL</b>	<b>\$ 2895.99</b>	

### 4.2 Timeline

	Winter 2003	Spring 2003	Summer 2003	Fall 2003	Winter 2004
Product Schematics					
Area of Inquiry	done on 1/29/03				
Written Proposal		done on 3/12/03			
Oral Proposal		done on 3/12/03			
Gather/Edit Multimedia				done by 1/1/04	
Prototype				done on 11/25/03	
Design Freeze				done on 12/3/03	
Freeze Presentation				done on 12/3/03	
Complete Product					done on 2/20/04
Testing					done on 3/1/04
Product Revisions					done on 3/1/04
Final Report					done on 3/8/04
Final Presentation					done on 3/8/04

## 5. Proof of Design

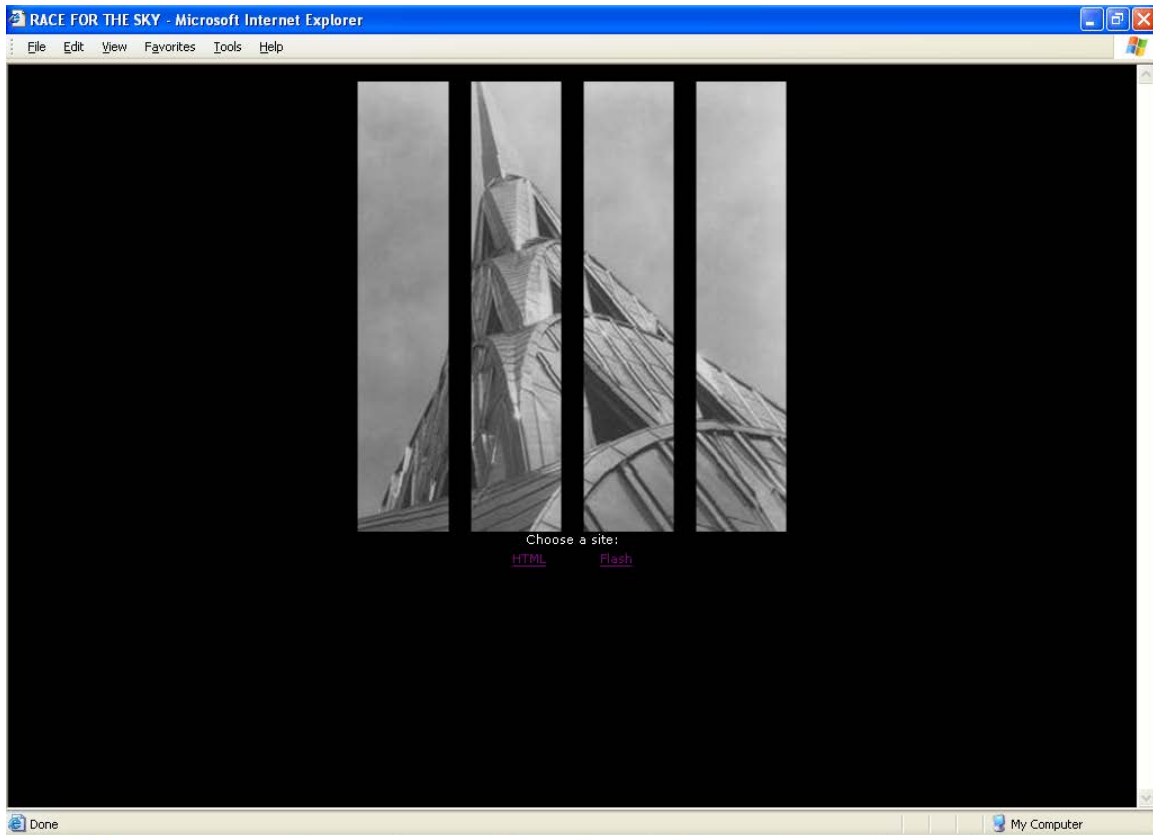
The deliverables decided in the Design Freeze phase of the project were met and are discussed below.

## **5.1 Dually coded (HTML and Flash) Web site**

The Web site has an option for a user to view the tutorial in either an HTML or Flash version, which are reasonably similar and consistent with each other. This option is given on the home page of the Web site at the bottom of the screen under the splash screen slideshow. This allows access to the Web site that is not dependent on the speed of neither the user's Internet access nor their own abilities, as the HTML Web site is faster to download and is consistent with the Americans with Disabilities Act guidelines.

## **5.2 Splash screen**

The opening page is an HTML splash screen introducing the Web site and giving the user a choice between HTML and Flash. The splash screen is a Javascript slideshow which rotates images of buildings with phrases, ending with the title of the project.



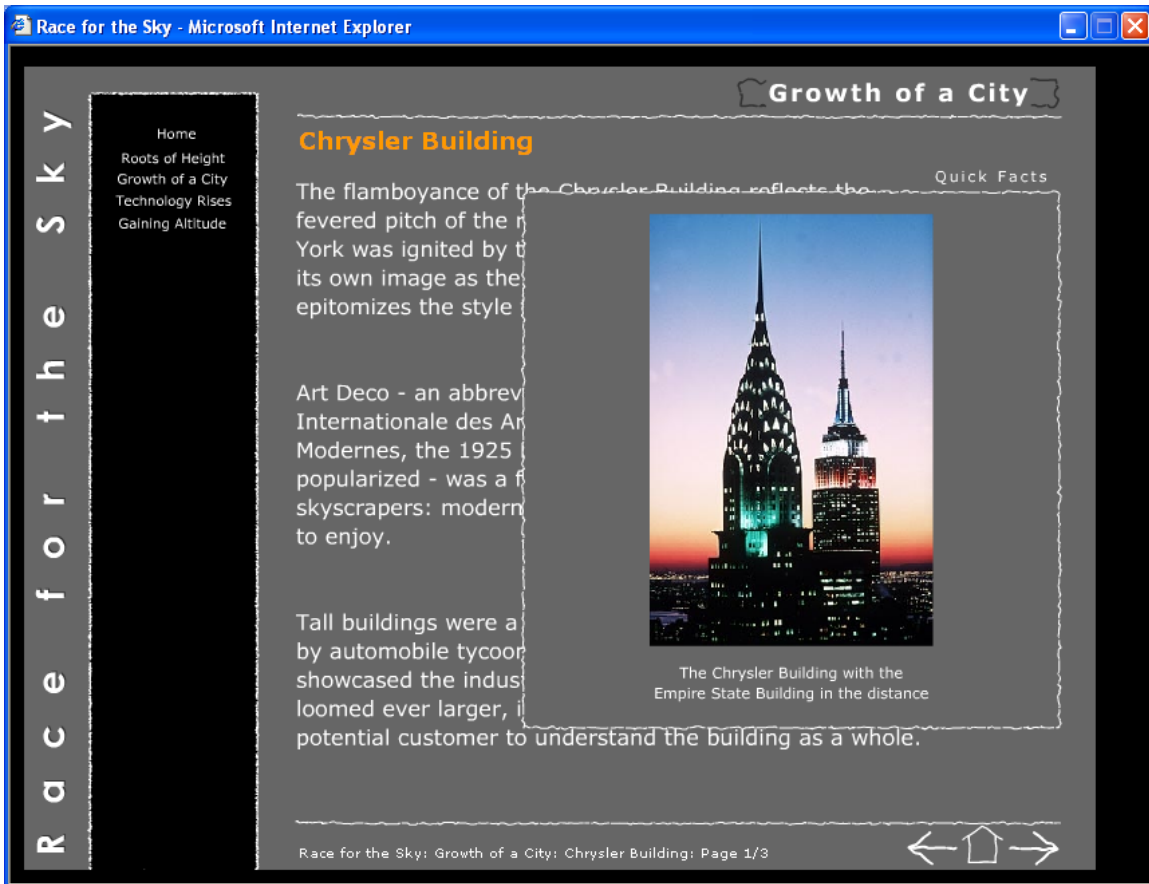
**Figure 2. Splash screen**

### **5.3 Multimedia Elements**

Each “chapter” and “page” has video, sound, images, or a combination of all three to support the material being presented. Period music and movies have been implemented to provide a context of the particular era being discussed. Images include photographs of people and artifacts of each era, as well as photographs, architectural drawings and postcards of the building being discussed.



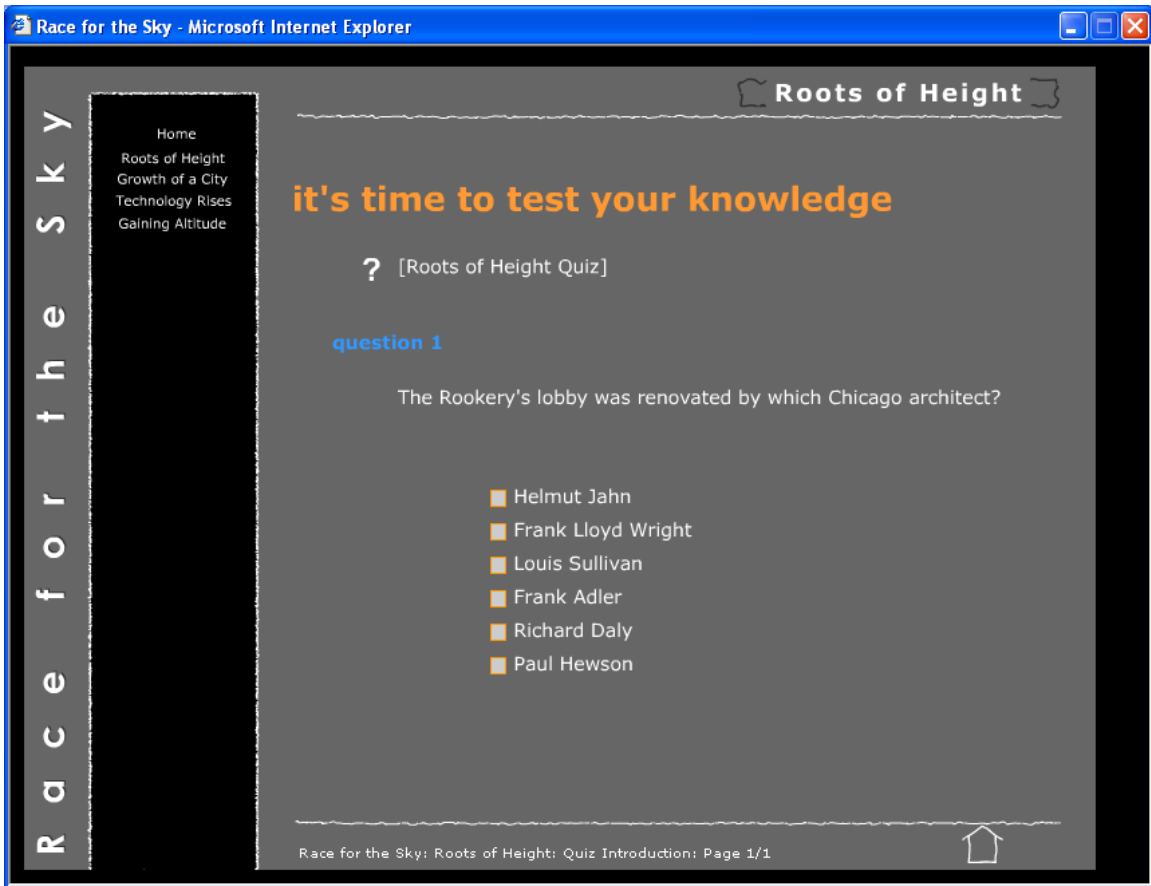
**Figure 3. Introduction page with integrated video clip of the movie “Metropolis”**



**Figure 4. Image slideshow**

## 5.4 Quizzes

Each “chapter” is followed by a quiz to reinforce what the user just learned. It is interactive, so that a click of a mouse is all that is required. The quiz is loaded from an XML file included in the Web site directory. The user answers each question and then is presented with a test score in the format of number of questions right out of number of questions total. The user is then given the option to review the quiz, seeing what answers are correct.



**Figure 5. Quiz question**

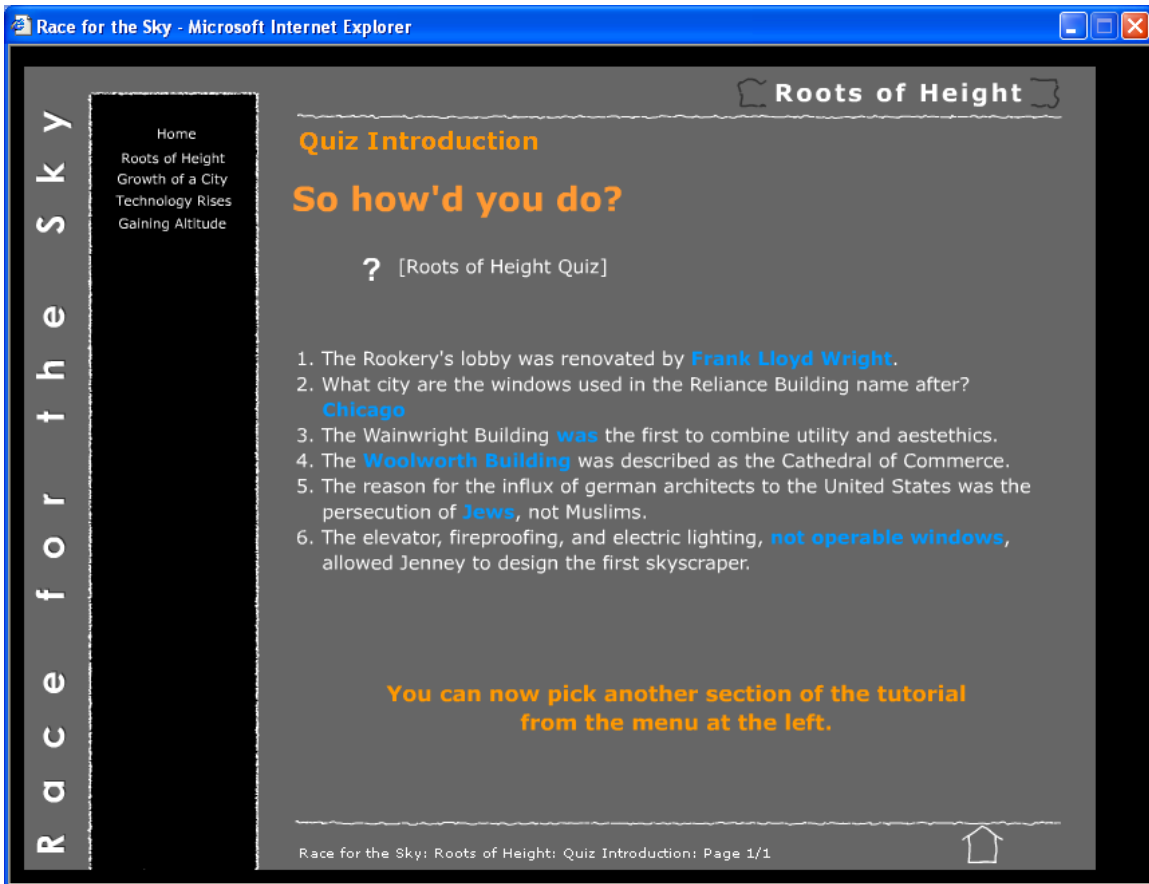


Figure 6. Quiz review

## 5.5 Preloader

A graphic preloader is implemented to show progress of the Flash movie being downloaded while the user waits. The preloader is a graphic line drawing of a city skyline which is progressively drawn on the screen while a graphic of the phrase “Loading...” is cyclically written to the screen. The preloader runs until all pages of the main Flash movie or the chapters are loaded into memory.

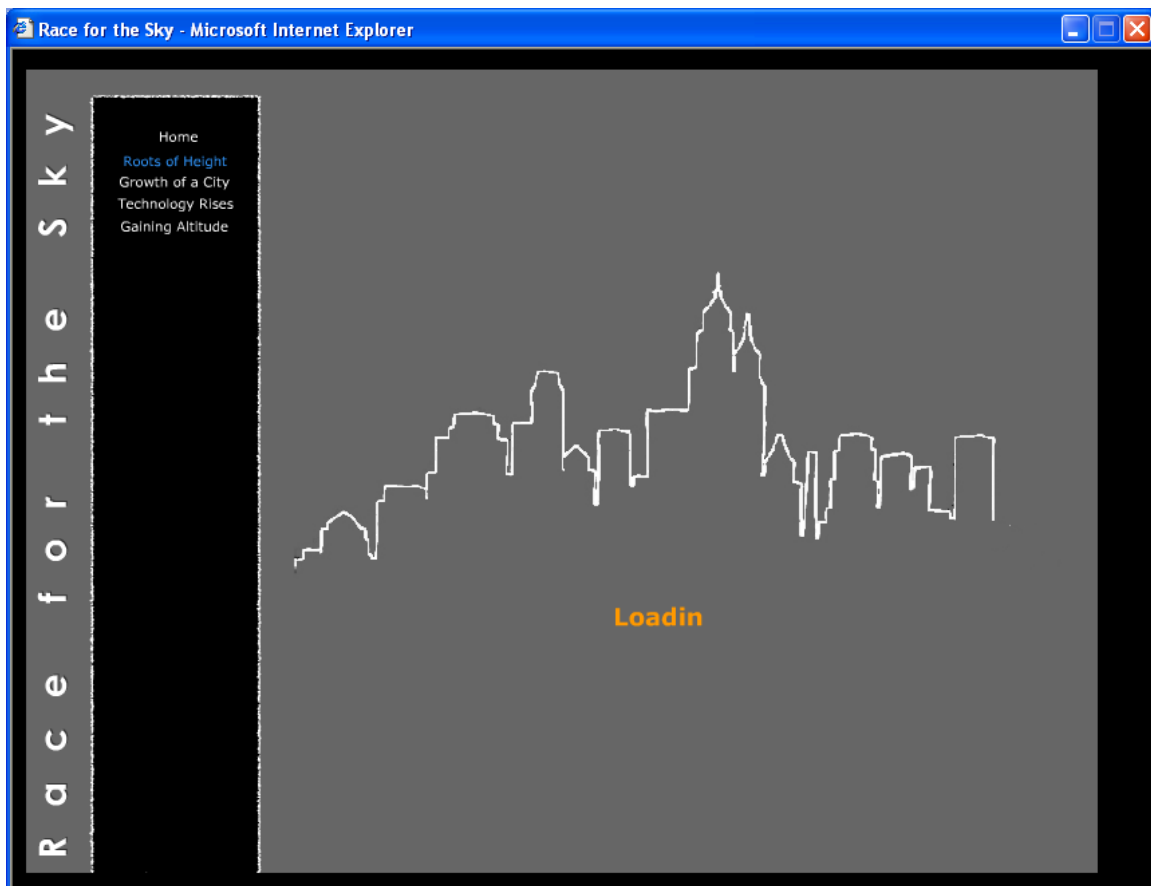


Figure 7. Graphic preloader for a chapter

## 6. Testing

Testing of the Web site found many challenges. Text for the pages was at 12 point font and too small for reading at length. There was also too much text on a page. The text was consequentially changed to 16 point font and spread over multiple pages if

needed. Initial testing also revealed that the Flash site was too large to be contained within one Flash document. It was then divided into one main document file with multiple smaller files which are called into the main file by a function. This increased the speed of load time for the Flash site. Also, the original Flash quiz was coded with reference to XML document which allowed the questions and answers to be written as needed instead of hard coded into the Flash document. Due to the nature of Flash and the work done prior to the quiz, the behavior of the quiz questions was inconsistent. Because of time constraints and the learning curve of integrating XML and Flash, the quiz was then hard coded into the Flash document.

## **7. Conclusion and Recommendations**

This project was created in response to my own experiences as a student in the College of Design, Architecture, Art and Planning at the University of Cincinnati. *Race to the Sky* demonstrates the possibilities of using multimedia projects in the classroom to include all learners and learning types in the teaching process. The use of images, sounds, and video integrated with text provide a medium for learning material that addresses the needs of multiple learning types. Using Macromedia Flash MX and DHTML allows the tutorial to be used by people who are differently-abled without restricting their access to the information. The project was completed over 15 months through three quarters of the Senior Design sequence. In a business setting, this project would cost approximately \$2895.99 without labor costs. The project fulfills all design deliverables.

A number of recommendations can be made concerning this project. The learning curve of Macromedia Flash MX can be steep, so consideration needs to be given to the

time needed to learn the program before embarking on a project such as this. A good foundation of knowledge in graphics and programming is necessary to complete this project. Also this project can be used as a prototype for similar projects in the future, but it is my recommendation that a technology such as XML be used to create the project in the form of templates. Creating this project as a template would allow for faster creation time and adaptation to a range of topics, not just a history of the skyscraper.

Insert Appendix A here

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