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Web-based computer tutorial compare and contrast two teaching formats for CT head image interpretation

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Web-Based Computer Tutorial: Compare and Contrast Two Teaching Formats for CT Head Image Interpretation

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Part I. Introduction

Abstract

Dr. Jim Anderson from the OHSU Radiology Department and I are developing a Web-based education project similar to one discussed at the Slice of Life Conference for Medical Multimedia Developers and Educators. Our project is based on CT Head images as opposed to spine images utilized by Dr. Pusic for his presentation during the Slice of Life Conference.[1] Web logs will be used to assess the participants' time per Web page as well as other, evaluative measurements such as use of a pre and post-test. [2] The Web program will be in two parts, each part used to compare and contrast two different teaching formats. Lecture Module I follows a PowerPoint slide information/lecture format with corresponding examples of head CT images. Lecture Module II will utilize more normal and abnormal head CT images and less lecture material. Both formats will incorporate a 10-question pre and post-test. The test will be composed of 1 to 2 normal head CT images or normal variants and 3 cases where the user must type in free text differential diagnosis answers. This will be more difficult than a multiple-choice selection as there is nothing textual to augment your memory. The other 5 questions will be multiple-choice selections for the correct diagnosis. The Web-based computer tutorial will be used to determine which teaching format is more effective: Lecture Module I (Arm 1) with more lecture material and less images or Lecture Module II (Arm 2) with more images and less lecture material.

Web based Training

Current uses in Medical Education

Why would we want to use computer-based tutorials in medical education? In some randomized controlled trials, computer-based tutorials have been shown to be more effective than traditional education methods.[3] Computer-based education allows the use of multimedia applications to enhance the educational experience of the user.[4] A medical literature search produced some examples of how computer-based tutorials have been used for medical education purposes.

Pusic et al developed two 30-minute multimedia computer tutorials for the Pediatric Emergency education computer at Johns Hopkins School of Medicine. The methods used to evaluate the effectiveness of the tutorials are very similar to the approach planned for our study. The tutorials, “Fever Without Source” and “An Approach to the Interpretation of Cervical Spine X-Rays” were designed for residents but also available for medical students and allied health professionals. The noted advantages of the computer tutorial included scheduling flexibility, user controlled pace of material, increased learning efficiency, greater interactivity, and the capacity for multimedia presentation. The first year pediatric residents enjoyed the tutorials the most while the allied health professionals (i.e. physician assistants and emergency room technicians) accounted for 29% of the tutorial users. While the pediatric residents and other personnel were willing to use the tutorials, the length of time required of the modules caused many users to log in multiple times in order to complete the programs. Time is a precious commodity for any resident. This must be kept in mind when developing computer-

based tutorials; keeping them down to manageable, discrete blocks of time to increase their attractiveness and usefulness to busy medical residents. [5]

Potts et al used 2 community-based medical school pediatric teaching services to identify and measure differences in knowledge of pediatric fluid management procedures. One group of students was taught using lecture and seminar while the other used computer tutorials. Using identical content but 2 different teaching methods, the computer group performed better than the seminar group in both multiple choice and free-answer tests. The computer tutorial method was more effective than lecture in this case based on the test scores of the two groups.[6] Other studies have shown that some students may prefer computer-based tutorials but it's effectiveness is equal to traditional education methods.[7-9]

In a study involving 267 third and fourth year medical students, Santer et al evaluated the instructional effectiveness of a multimedia textbook as compared to standard lecture and a printed textbook. The multimedia textbook contained audio, video and animation that allowed the user to enjoy a more interactive educational experience. Similar to other studies, the subjective response of the students to the use of multimedia was positive.[7-10] The multimedia textbook was found to be more instructionally effective than the lecture but was equal to the lecture and the printed textbook in instructional efficiency.[10]

Bridgemohan et al evaluated pediatric resident perceptions comparing facilitated case discussion with computerized tutorials. The facilitated case discussion involved 8 to 12 residents with a trained facilitator leading a structured case discussion while the computer groups worked 2 to 3 people together at a computer linked to an interactive Website. It was concluded that each education style stimulated different types of learning among the residents. The structured lecture provided more interaction with the facility and was more clinically relevant. The computer-based education was more fun, provided more flexibility and appealed to a wider range of learning styles with the use of audio, visual and interactive methods of informational presentation. Future research is needed to see how to merge both methods into a more effective teaching style.[11]

Web Site Creation

By posting our educational material on the Internet, anyone with a computer and an Internet connection can access the CT Head program wherever they are and whenever it is most convenient for them to do so. There are many factors to consider when putting a Web-based program together. Next, we will discuss some background information to help understand the different pieces that are needed for this type of project.

Hypertext Markup Language (HTML)

HTML stands for Hypertext Markup Language and is a subset of a comprehensive or “meta” language called Standard Generalized Markup Language (SGML). SGML is the parent language of HTML. HTML language contains individual pieces that define what

is seen in on a Web page. These pieces are made up of tags, attributes, and values. The following line;

```
<h2><font color="red">Demographic Screen</center></font></h2>,</pre>
```

is an example of HTML code. Opening and closing brackets create a tag and in this case opens the **font** tag while closes the **font** tag. **COLOR** is an attribute of the font tag and in this case is the value of **RED**. This tells the browser to make the text; **Demographic Screen**, the color red on the Web page.[12]

Some common HTML tags are;

| | |
|------------------|--|
| <html></html> | creates an HTML document |
| <head></head> | sets off the title and other information that isn't displayed on the Web page itself |
| <body></body> | sets off the visible portion of the document |
| <p></p> | creates a new paragraph |
| | adds an image |
| <table></table> | creates a table, tables are commonly used to format the contents of a Web page. |

There are 3 primary elements of a Web page; text, graphics, and links. Text is the written language displayed on the Web page. Graphics can be non-moving elements of a Web page such as pictures, photographs, or icons such as buttons. Links or hyperlinks are imbedded commands that when selected by the user, redirects the Web browser to a different part of the Web page or to another Web page entirely.[12]

Web Browsers

A browser is a software program that is designed to translate HTML code into a visible Web page. Some of the more common Web browsers are Microsoft's Internet Explorer, Mozilla, Netscape Navigator and Macintosh's new Web browser called Safari. There are add-on programs called Plug-ins which enhance the functionality of the Web browsers and allow them to run small programs called Java applets, view movies or play audio files. (See Fig 1 & 2)



Figure 1. Internet Explorer Web Browser

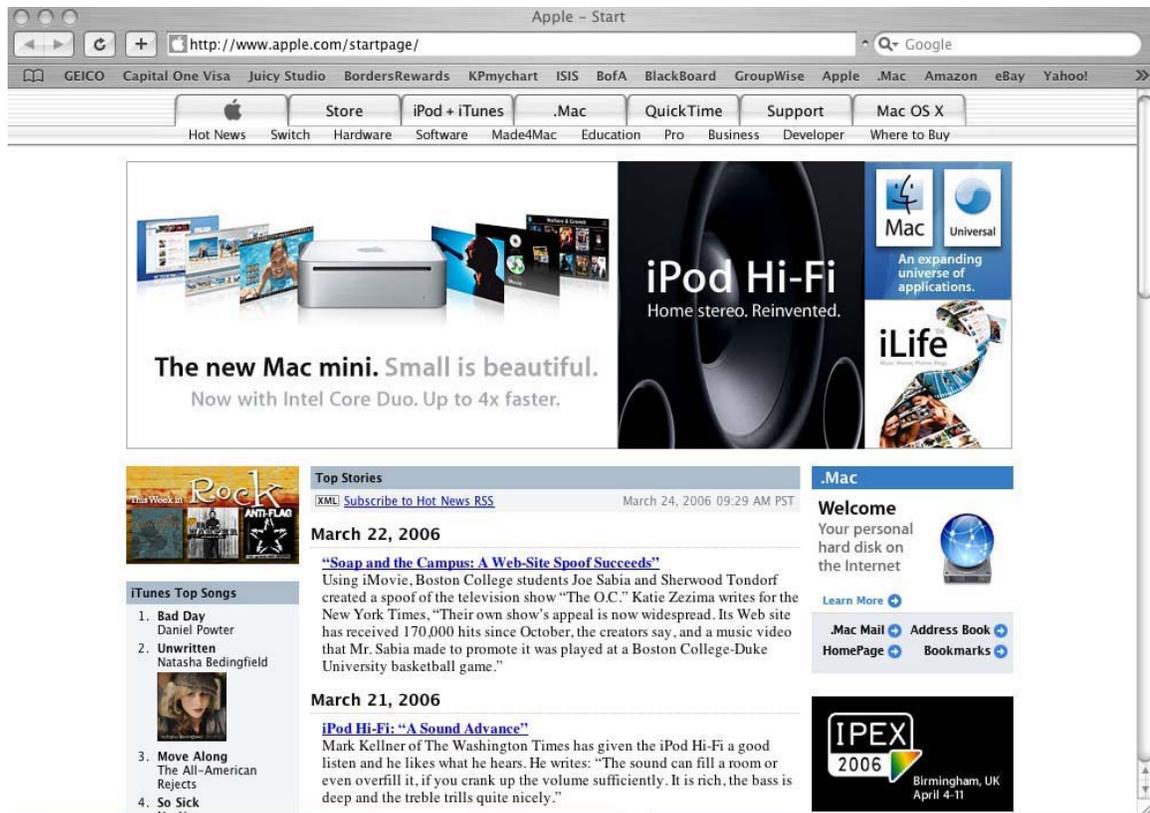


Figure 2. Safari Web Browser

Cascading Style Sheets (CCS)

A style sheet is a master document that defines how elements of the Web page will appear for all Web pages that are referenced to that style sheet. For example, you could define your H1 tags (header tag) as `H1 { color: purple; text-align: center; font-family: "Comic Sans MS" }`. For each Web page referencing your style sheet, all of the H1 text will display with these specified criteria. The use of style sheets allows Web authors to maintain consistency between multiple pages of a Web site and simplifies visual changes. If you want to change the font of your Web site, you only have to change the style sheet instead of changing the font tag on each individual Web page. Style sheets are typically

created with a “.css” extension such as “mystyle.css” and would be linked to a Web page inside the HEAD element as follows:

```
<LINK REL="stylesheet" HREF="mystyle.css">
```

The “.css” extension is not required by the HTML language but makes the code easier to find and to read.[13]

Style Sheets can be considered an entity while Cascading Style Sheets is a form of Style Sheets. Cascading is syntax for defining not only the style of the elements but also the order of relevance for those elements. It answers the question, “What takes priority and when?” You can alter text appearance by defining the style “inline” or within the Web page itself, right where the text is defined. Cascading style sheet syntax tells the Web browser what parts of the style sheet elements takes precedence and what parts of the inline style sheet takes precedence. A Web page can pull style information from 3 different areas; 1) within the HEAD tag, 2) from the Style Sheet, and 3) from the Inline style definition. This offers great flexibility when defining how your Web pages will look.[13]

Java and JavaScript

Java is an object oriented programming language created by Sun Microsystems. It is similar to C++ programming language but has been simplified to eliminate some language features that cause common programming errors. One of the main differences between Java and other computer languages is that Java is platform independent. This means Java programs can be run on many different types of computers by use of a Java

Runtime Environment that creates a virtual computer environment in order to execute the Java commands. It is this cross-platform flexibility which makes Java especially suited for work on the Web.[14]

Java can be used in different ways on the Internet. Javascript can interact with HTML code to allow programmers to create Web pages that do more than just display static information. Javascript is a little different than Java. It shares many of the features and structures of the full Java language but was developed independently. Javascript allows the user to interact with dynamic content within the Web page. Applets are Java programs that run directly within the Web browser. Servlets are Web-based Java programs that run on an Internet server computer rather than in the Internet Web browser.[14]

Backend Database

For our CT Head program, we want to gather information from the user such as login, password, demographics and their answers to the pre-test and post-test. In order to store this information, I have created a database using Microsoft Access. The database is relational or is composed of data in tables that are interrelated some how. For this database, the "log_id" or the user's login name is linked to the other tables so that the data within the Demographic, Pretest and Posttest tables can all be traced back to one person. The data within the database is access through SQL or Structure Query Language, which was originally invented by IBM in the 1970s.[14]

In order to get the user information into and out of the database, we must connect the Web site to the database. This is done with JDBC or Java Database Connectivity, which lets you formulate SQL statements to send to the database server and return the processed results.[14] (See fig. 3)

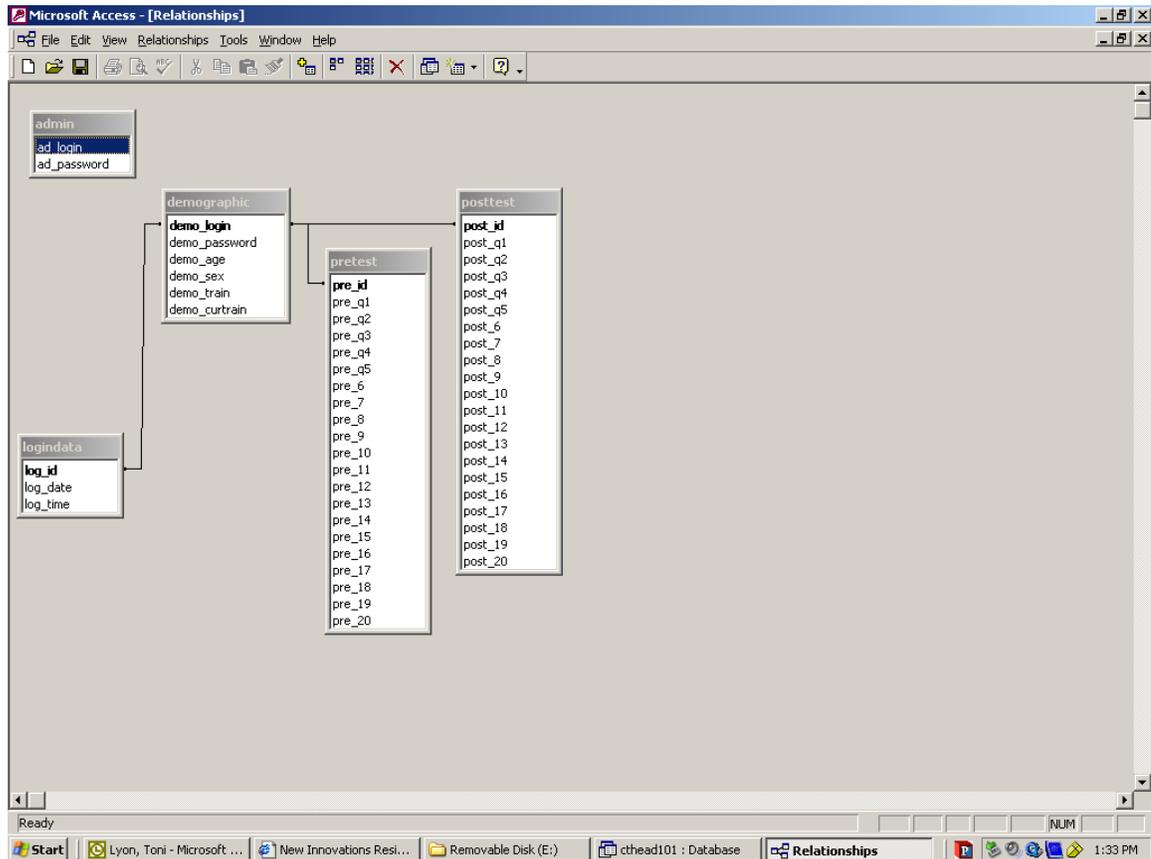


Figure 3. Access Database Schema

Web Server

A web server is a computer that manages and shares web-based programs that can be accessed via the Internet from any computer. At OHSU, each student has access to a Web server called MEDIR. Web files can be up loaded to the MEDIR server through TELNETSELLWOOD.OHSU.EDU by using an FTP or File Transfer Protocol program.

BMI 581 Capstone Project
Glen A. Blanchard

Dr. Christopher Dubay
March 24, 2006

Dr. Anderson is still working on content for the program at this time. When the content and the associated Web pages are completed, I will upload the entire program to the MEDIR computer at one time.

Part II. Project

Capstone Project

Project discussion

Project purpose

My capstone project is the design and development of a Web-based computer tutorial based on Dr. Anderson's CT head lecture material. The web-based computer tutorial will be used to test 2 different lecture styles to determine which teaching style is more effective. After the computer tutorial is completed, Dr. Anderson will seek study participants to use the Web-based tutorial. We will then analyze the data obtained from the pre and post test scores as well as the Web logs related to the amount of time per page spent by each user; contrasting Lecture Module I with Lecture Module II. The makeup of subjects will be the same as those whom the CT Head lecture is originally intended; medical students, medical residents and Interns. New radiology residents could utilize the Web-based computer tutorial but by the end of their first year of residency training, the radiology residents should be well beyond the level of this test.

Project development

Dr. Anderson, a neuroradiologist at Oregon Health and Sciences University, is responsible for teaching neurology, neurosurgery, and internal medicine residents the basics of reading head Computerized Tomography (CT) images. He also teaches third and fourth year medical students who rotate through radiology. Some of the students, but not all, are interested in pursuing a radiology residency program.

Dr. Anderson and I are developing a Web-based education project similar to one discussed at the Slice of Life Conference for Medical Multimedia Developers and Educators that deals with spine images rather than head CT images[1]. Web logs will be used to assess the participants time per Web page as well as other, evaluative measurements [2]. The Web program will be in 2 parts, each part used to compare and contrast different teaching formats. Lecture Module I follows a PowerPoint slide information/lecture format with corresponding examples of head CT images. Lecture Module II will utilize more normal and abnormal head CT images and less lecture material. Both formats will incorporate a 10-question pre and posttest. The test will be composed of 1 to 2 normal head CT images or normal variants and 3 cases where the person must type in free text differential diagnosis answers. This will be more difficult than a multiple-choice selection as there is nothing textual to jog the user's memory. The other 5 questions will be multiple-choice selections for the correct diagnosis.

For Lecture Module I, Dr. Anderson already has the basic information for the Web content from the lectures he currently gives in PowerPoint presentation format. He will obtain all CT images to be used for both Lecture Module I and Lecture Module II. Dr. Anderson is still working on the content for Lecture Module II. There will also be a follow-up test 1 to 2 weeks after the posttest.

Some of the features Dr. Anderson and I discussed include the following;

- We originally discussed having the user randomly assigned to Lecture Module I or II. Dr. Anderson recently mentioned discussing the study design with a statistician who suggested that rather than make the lecture selection totally random, it may be better to determine the lecture selection based on the demographic information entered by the user. Future meeting will determine how we proceed with this portion of the program.
- The program must track length of time the person spends on each page and will utilize Web logs to accomplish this task[2]. The pretest/lecture/posttest should take about 30 to 45 minutes all together.
- The person should not be able to start the post-test and go back to the lecture for reference.
- The program may post the person's pre-test and post-test score only after the post-test is completed. Dr. Anderson feels this may encourage the user to complete the entire module, thereby obtaining both sets of data from the user for comparison.
- The user will need to log in and obtain a login identification so each participant can be uniquely identified. I would like the user to enter their email address as their login ID. This has 2 advantages; 1) is that their email by nature is unique for each user and 2) we would be able to contact the user via email if necessary to obtain any additional study related information. The program will also track which lecture format the user has taken.

Study proposal

Once the program has been completed to include the 2 arms of the lecture material, Dr. Anderson will contact the OHSU Institutional Review Board (IRB) to seek study approval. Dr. Anderson will also submit applications for grant funding related to completing and/or expanding this study. The ultimate goal is to expand the study to 4 arms of lecture material and submit the study background and results in a final paper format suitable for publication.

Outline for Neuroradiology CT Interpretation Module Web Pages

Intro Screen

Time needed

30 minutes to 1 hour

Monitor evaluation

Standard test pattern

Expectations

Log In Screen

ID and password

Notice that once you exit you will not be able to be included in study data unless you complete the module

Demographic Screen

CT Experience

None

Exposure during medical school classes

Some directed education in interpretation of CT- brain studies (i.e. self-learning modules, lectures, personal instruction)

Occasionally use your own evaluation of CT-brain studies (i.e. you occasionally need to and have reviewed CT-brain studies for your duties)

Extensive reading and/or interpreting CT-brain studies

Sex

Age

Training level

M2, M3, M4

R1/Intern

R2

R3

R4 or >

Current (as of July 1) training position

Medical student (note level and area of interest if you have one)

Radiology

Neurology

Neurosurgery

Emergency Medicine

Internal Medicine or subspecialty (note subspecialty)

Study instructions

Take pre-test

Proceed through the module at your own pace

Feel free to review any area more than once

When you are comfortable with the material, proceed to post-test

Arm specifics

Arm 1 (powerpoint arm) and Arm 2 (case example arm)

Instructions:

For the testing portions of this study, you will have 60 seconds to review the images then the screen will change to the answer screen for you to enter whether the case was normal, equivocal, or abnormal and what the finding was if equivocal or abnormal. If you have the answer prior to 60 seconds, click on the answer button to proceed to the answer screen.

Pre-test

Case 1

Case 2

Case 3

Case 4

Case 5

Case 6

Case 7

Case 8

Case 9

Case 10 (? More if needed)

Both: Arm 1 and 2

Explanation of densities on CT scans

List of things that are lighter than brain

List of things that are darker than brain

Explanation of slices and volume averaging

Arm 1

Standard CT – brain approach lecture slides

Redo to make more self-directed

Arm 2

Quick outside-in explanation (i.e. list approach and list vital areas to look at)

Examples

Blood

Normal and SAH in various locations and amounts

SDH and EDH

Mimics of above

Common pitfalls

Other “bright” things

Aneurysms

Tumors, meningiomas

Calciums

Fractures

Use of scalp and air to localize

Skull base, t-bone and in-plane fractures

Normal sutures and fractures

Low densities

PVWM

Infarct

Inflammation, infection

Tumors

Cisterns, ventricles and shift/herniation

Cistern anatomy review

Swelling

Ventricle appearance normal and various variations

Subtle and overt shift/herniation

Conclusion

This project is a work in progress. I have created Web pages based on the information content Dr. Anderson has been able to produce but there is much more work to be done. I have agreed to continue working with Dr. Anderson beyond this capstone project in order to develop and produce a working model of the CT Head program. Some of the pending content from Dr. Anderson includes;

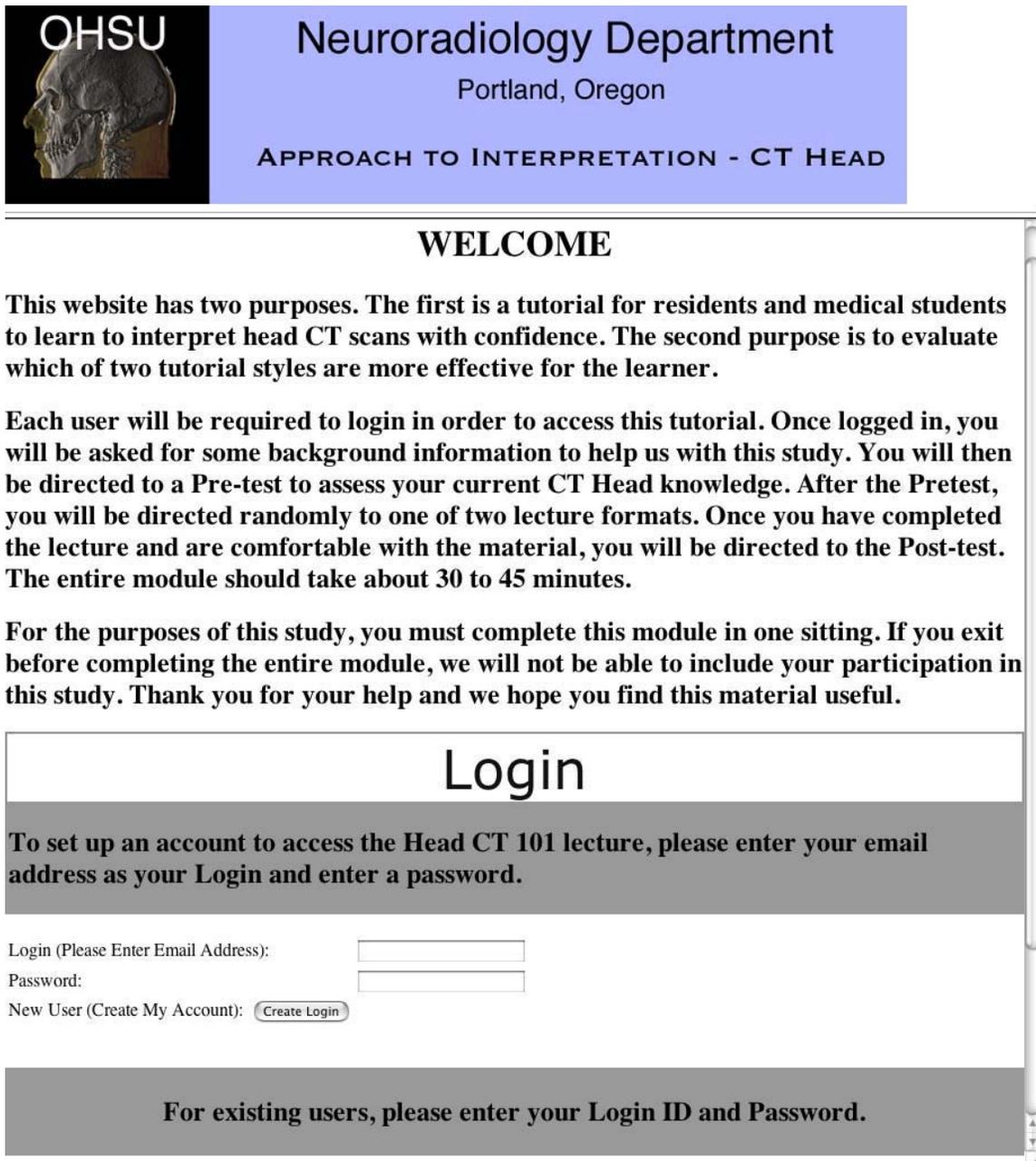
- Arm 2 of the lecture
- Test questions and images, to include correct and incorrect answers for the user to select during the test. Dr. Anderson has recently supplied the images and test questions but no correct or incorrect answers for the user to select.

Details from the statistician will be needed in order to decide how the user's demographic information will be used to direct the user to which lecture module. This will affect the Java code. Once the content and details are finalized, I can continue working on the Java code to send and receive the user data to the database. Dr. Anderson and the statistician must decide exactly how the measurements of the study will be done. This is necessary for me to write the Java code to pull the necessary data and present it in a report to be accessed through the Administration Login screen. Much of the Java code is incomplete at this point in time. When the Web pages are complete, I will then upload the program to the MEDIR server. At that point, we can perform some user tests for feedback in order to edit the program before the actual start of the study.

I have enjoyed working on this project and look forward to producing the final, working program. I hope to be included as an author for the proposed publication.

Appendix

Web page screen shots



The screenshot shows the top of a web page with a blue header. On the left is the OHSU logo featuring a skull. The header text reads: "Neuroradiology Department", "Portland, Oregon", and "APPROACH TO INTERPRETATION - CT HEAD". Below the header is a "WELCOME" section with three paragraphs of text. The first paragraph states the website's purpose: a tutorial for residents and medical students to learn to interpret head CT scans with confidence, and to evaluate two tutorial styles. The second paragraph explains the user flow: login, background information, pre-test, random assignment to one of two lecture formats, completion of the lecture, and post-test, with a total time of 30 to 45 minutes. The third paragraph states that the module must be completed in one sitting. Below this is a "Login" section with a grey background. It contains the text: "To set up an account to access the Head CT 101 lecture, please enter your email address as your Login and enter a password." This is followed by two input fields: "Login (Please Enter Email Address):" and "Password:". Below these is a "New User (Create My Account):" label and a "Create Login" button. At the bottom of the login section is a grey bar with the text: "For existing users, please enter your Login ID and Password."

Introduction/Login screen



Neuroradiology Department
Portland, Oregon

APPROACH TO INTERPRETATION - CT HEAD

Demographic Screen

1) Sex:
 Male
 Female

2) Age:
 20 or younger
 21 to 23
 24 to 26
 27 to 29
 30 to 32
 33 to 35
 36 to 38
 39 to 41
 42 or greater

3) Training Level:
 Resident/Intern/First year Medical Student - Second year
 Resident - Second year Medical Student - Third year
 Resident - Third year Medical Student - Fourth year
 Resident - Fourth year or >

4) Current (as of July 1) Training Position:
 Medical Student
 Radiology
 Neurology
 Neurosurgery
 Emergency Medicine
 Internal Medicine/Subspecialty
Subspecialty - Please note subspecialty type:

5) Medical student with strong interest in or significant prior exposure to radiology:
 Yes
 No

Demographics screen

OHSU

Neuroradiology Department
Portland, Oregon

APPROACH TO INTERPRETATION - CT HEAD

Approach to Interpretation

- Slide 2
- Slide 3
- Slide 4
- Slide 5
- Slide 6
- Slide 7
- Slide 8
- Slide 9
- Slide 10
- Slide 11
- Slide 12
- Slide 13
- Slide 14
- Slide 15
- Slide 16
- Slide 17
- Slide 18
- Slide 19
- Slide 20
- Rapid Review of CT - Brain
- Rapid Review of CT - Brain
- Look at the 4th Ventricle:
- Rapid Review of CT - Brain
- Look at 3rd ventricle:
- Rapid Review of CT - Brain
- Look at lateral ventricles:
- Look at lateral

Approach to Interpretation

CT - Brain

Slide 1 of 48

Arm 1 Lecture

Arm 2 Lecture – still under development by Dr. Anderson

Printed HTML Source Code

Default page

```
<HTML>
<HEAD>
<TITLE>CT Head Main Menu</TITLE>
</HEAD>
<!--This is the default page to display the header logo on the top frame and the content
on the bottom frame. Glen Blanchard Capstone Project March 2006-->
<FRAMESET ROWS="35%,*">
    <FRAME SRC="images/ctheader.gif" SCROLLING=YES>
    <FRAME SRC="login.htm" name=display SCROLLING=YES>
</FRAMESET>
</HTML>
```

Introduction/Login screen

```
<!DOCTYPE HTML PUBLIC "-//E3C//DTD HTML 4.0//EN">
<html>
<head>
<!-- Login page for CT Head 101, code used from Illusive Design
(http://www.illusivedesign.com)-->
    <title>Intro Screen</title>
    <meta name="description" content="Login Screen for CT Head 101">
    <script type="text/javascript" language="javascript"></script>
    <style type="text/css"></style><!-- Start Content--><br>
    <h1 align="center">WELCOME</h1>
<p><h2>
This website has two purposes. The first is a tutorial for residents and medical students
to learn
to interpret head CT scans with confidence. The second purpose is to evaluate which of
two
tutorial styles are more effective for the learner.</h2>
</p>
<p><h2>
Each user will be required to login in order to access this tutorial. Once logged in, you
will be
asked for some background information to help us with this study. You will then be
directed to a Pre-test
to assess your current CT Head knowledge. After the Pretest, you will be directed
randomly to one of two
lecture formats. Once you have completed the lecture and are comfortable with the
material, you will be
```

directed to the Post-test. The entire module should take about 30 to 45 minutes.

For the purposes of this study, you must complete this module in one sitting. If you exit before

completing the entire module, we will not be able to include your participation in this study. Thank you for your

help and we hope you find this material useful.

*****-->

<form name="thisForm" action="" method="post">

<table width="100%" bgcolor="#999999">

<tr align="center">

<td bgcolor="white">Login</td>

</tr>

<tr>

<td><h2>To set up an account to access the Head CT 101 lecture, please enter your email address as your Login and enter a password.</h2></td>

</tr>

</table>

<table>

<tr>

<td align="left">Login (Please Enter Email Address): </td>

<td align="left"><input name="txtLogin" value="" type="text">
</td>

</tr>

<tr>

<td align="left">Password: </td>

<td align="left"><input name="txtPassword" value="" type="password"></td>

</tr>

<td align="left">New User (Create My Account): <input name="cmdSubmit2" value="Create Login" type="submit"></td>

</tr>

</table>

<table width="100%" border="0" cellspacing="3" cellpadding="3" bgcolor="#999999" align="center">

<tr align="center">

<td><h2>For existing users, please enter your Login ID and Password.</h2>

</tr>

</table>

<table>

<tr>

<td align="left">Login (Please Enter Email Address):</td>

<td align="left"><input name="txtLogin" value="" type="text"></td>


```
{blRadio=true;i=document.thisForm.rdoSex.length;}}
if (!blRadio){alert("You must select either male or female in #1!");return false;}}
if(document.thisForm.rdoAge)//validate radiobuttons question 2 about age
{for(i=0;i<document.thisForm.rdoAge.length;i++)
{if(document.thisForm.rdoAge[i].checked)
{blCheck=true;i=document.thisForm.rdoAge.length;}}
if(!blCheck){alert("You must select an age range in section #2!");return false;}}
if(document.thisForm.rdoTrainLevel)//validate radiobuttons question 3 training level
{for(i=0;i<document.thisForm.rdoTrainLevel.length;i++)
{if(document.thisForm.rdoTrainLevel[i].checked)
{blCheck=true;i=document.thisForm.rdoTrainLevel.length;}}
if(!blCheck){alert("You must select a training level in section #3!");return false;}}
if(document.thisForm.rdoTrainPosition)//validate radiobuttons question 4 training
position
{for(i=0;i<document.thisForm.rdoTrainPosition.length;i++)
{if(document.thisForm.rdoTrainPosition[i].checked)
{blCheck=true;i=document.thisForm.rdoTrainPosition.length;}}
if(!blCheck){alert("You must select a training position in section #4!");return false;}}
if(document.thisForm.rdoMedExp)//validate radiobuttons question 5 about medical
student interest/experience in radiology
{for(i=0;i<document.thisForm.rdoMedExp.length;i++)
{if(document.thisForm.rdoMedExp[i].checked)
{blRadio=true;i=document.thisForm.rdoMedExp.length;}}
if (!blRadio){alert("You must select either yes or no in #5!");return false;}}
</script>
<form name=thisForm action="demographic.htm" action="mailto:blanchag@ohsu.edu"
method=get onsubmit="return ValidateForm();">
1) Sex:<br>
    <table>
        <tr>
            <td>
                <input type=radio name=rdoSex value="">Male<br>
                <input type=radio name=rdoSex value="">Female<br>
            </td>
        </tr>
    </table><br>
2) Age:<br>
    <table>
        <tr>
            <td>
                <input type=radio name=rdoAge>20 or younger<br>
                <input type=radio name=rdoAge>21 to 23<br>
                <input type=radio name=rdoAge>24 to 26<br>
                <input type=radio name=rdoAge>27 to 29<br>
                <input type=radio name=rdoAge>30 to 32<br>
                <input type=radio name=rdoAge>33 to 35<br>
            </td>
        </tr>
    </table>
```

```

        <input type=radio name=rdoAge>36 to 38<br>
        <input type=radio name=rdoAge>39 to 41<br>
        <input type=radio name=rdoAge>42 or greater<br>
    </td>
</tr>
</table><br>
3) Training Level: <br>
<table>
    <tr>
        <td>
            <input type=radioname=rdoTrainLevel>Resident/InternFirstyear<br>
            <input type=radio name=rdoTrainLevel>Resident - Second year<br>
            <input type=radio name=rdoTrainLevel>Resident - Third year<br>
            <input type=radio name=rdoTrainLevel>Resident - Fourth year or ><br>
        </td>
        <td>
            <input type=radio name=rdoTrainLevel>Medical Student - Second year<br>
            <input type=radio name=rdoTrainLevel>Medical Student - Third year<br>
            <input type=radio name=rdoTrainLevel>Medical Student - Fourth year<br>
        </td>
    </tr>
</table><br>
4) Current (as of July 1) Training Position: <br>
<table>
    <tr>
        <td>
            <input type=radio name=rdoTrainPosition>Medical Student<br>
            <input type=radio name=rdoTrainPosition>Radiology<br>
            <input type=radio name=rdoTrainPosition>Neurology<br>
            <input type=radio name=rdoTrainPosition>Neurosurgery<br>
            <input type=radio name=rdoTrainPosition>Emergency Medicine<br>
            <input type=radio name=rdoTrainPosition>Internal Medicine/Subspecialty<br>
            Subspecialty - Please note subspecialty type:
            <input type=text input size="60" name=txtKeywords value=""
            MAXLENGTH=60 onblur="javascript://isTextEmpty(this);"><br>
        </td>
    </tr>
</table><br>
5) Medical student with strong interest in or significant prior exposure to radiology:
</font><br>
<table>
    <tr>
        <td>
            <input type=radio name=rdoMedExp value="">Yes<br>

```

```
                <input type=radio name=rdoMedExp value="">No<br>
                </td>
            </tr>
        </table>
    <table>
        <tr>
            <td align="center" valign="bottom">
                <input type=submit name=cmdSubmit value="Submit Demographic Information"></td>
            <td align="center" valign="bottom"><input type=reset
                name=cmdReset value="Reset"></td>
        </tr>
    </table>
</table><br>
</form>
</body>
</html>
```

Arm 1 Lecture **Note – Microsoft Powerpoint program allows you to save your standard presentation as a Web presentation. This was done for Arm 1 lecture and will be done for Arm 2 lecture. The Web presentation is then modified as needed to fit within our program. This HTML code is the Lecture.htm file. All the supporting HTML and images are referenced in the Lecture_files folder.

```
<html>

<head>
<meta name=Title content="PowerPoint Presentation - Slide 1">
<meta name=Keywords content="">
<meta http-equiv=Content-Type content="text/html; charset=macintosh">
<meta name=ProgId content=PowerPoint.Slide>
<meta name=Generator content="Microsoft Macintosh PowerPoint 10">
<link rel=Edit-Time-Data href="Lecture_files/editdata.mso">
<link rel=OLE-Object-Data href="Lecture_files/oledata.mso">
<title>PowerPoint Presentation - Slide 1</title>
<link title="Presentation File" type="application/powerpoint" rel=alternate
href="Lecture_files/Lecture.ppt">
<meta http-equiv=expires content=0>
<script language=JavaScript src="Lecture_files/script.js"></script><script
language=JavaScript><!--
LoadHTMLVersion();
if (g_ShowFSDDefault ) FullScreen();//-->
</script>
</head>

<frameset rows="178,*" framespacing=1 frameborder=1>
```

```
<frame src="cheader.gif" marginheight=0 marginwidth=0>
<frameset rows="*,35" framespacing=1 frameborder=1>
  <noframes>
    <body>
      <p>This page uses frames, but your browser doesn't support them.</p>
    </body>
  </noframes>
  <frame src="Lecture_files/frame.htm" name=MainFrame marginheight=0
marginwidth=0>
    <frameset cols="20%,*">
      <frame src="Lecture_files/outline_navigation_bar.htm" name=PPTOutlNav
marginheight=0 marginwidth=0 scrolling=no noresize>
      <frame src="Lecture_files/navigation_bar.htm" name=PPTNav marginheight=0
marginwidth=0 scrolling=no noresize>
    </frameset>
  </frameset>
</frameset>

</html>
```

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