Designing an Interactive Web-based Tutorial for Health Sciences Students: A Collaborative Library Project

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INFORMATICS EDUCATION

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ABSTRACT. This column describes the creation of an online interactive tutorial for health

sciences students in a general library at a large, urban university. The project was a collaborative

effort between the health sciences subject librarian, the library's web programmer, an assessment

and user services librarian, and an instructional support specialist. The column details the initial

exploration, design, web programming, student usability study, and subsequent upgrades to the

tutorial. Implementation of the tutorial is discussed as well as sampled student input. The effort

resulted in the design of improved and more versatile open access coding available for any

library to use.

KEYWORDS. Academic libraries, collaboration, education, Guide on the Side, technology,

tutorials, web-based tutorials

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INTRODUCTION

Georgia State University (GSU) in downtown Atlanta, Georgia, is the largest higher education institution in the state, with over 53,000 students. GSU has been called a "commuter school" because of the number of distance education students and non-traditional attendees. GSU has six campus locations, each with a separate library. Very little face-to-face class time with students is allotted and academic librarians face the usual challenges of getting information literacy instruction integrated into the curricula. One-shot instruction sessions are not enough for students to thoroughly understand complex searching strategies. In response to this dilemma, the GSU library's Public Services Department was charged with the goal of incorporating innovative instruction methods into the instruction delivered to students. To better reach and serve the students, online instruction at the users' own pace should be an option. As Yi pointed out, online instruction requires "students to be actively involved in the learning process rather than sitting in lectures passively. It emphasizes interactivity, self-direction and learner-initiation."[1] The health sciences librarian's objectives were to create an interactive tutorial students could use to strengthen their searching skills and understand the concepts behind bibliographic databases without regard to time or place.

CREATING THE ONLINE TUTORIAL

Phase 1: Exploring Existing Software

Various applications had previously been used at GSU to create tutorials, including screencasting software Camtasia and Captivate, web conferencing software such as WebEx, web courseware like iCollege, and content management systems (CMSs) like Drupal, but none supported a "live" interactive interface. The ability to reach a larger audience through an online system was important, but the librarians wanted to avoid using an application that only offered passive viewing and didn't require any interaction. Student control of the pace and replaying of information was also an important factor.

A quick literature review found a tutorial product that appeared to meet the needs of the library. Sult, Mery, Blakiston, and Kline, colleagues at the University of Arizona, described the software Guide on the Side (GOTS) she co-developed as "a two-window tutorial format where one window offers the core content of a particular module while the other window shows additional content and allows for hands-on practice and application."[2] In their resource review of GOTS, Schmidt and Hartman stated that "students love the immediate feedback that they receive when they answer interactive multiple-choice questions embedded in the tutorial and seem to appreciate the posttests."[3] Thus, the software Guide on the Side was chosen by the health sciences subject librarian as a tutorial platform for instruction that produces interactive "live" web-based tutorials. GOTS is also a free, open source product available at <http://code.library.arizona.edu/>. The health sciences librarian chose PubMed as the first tutorial to pursue because it is available freely via the <http://www.pubmed.gov> interface and is the most frequently used database for the health sciences.

Phase 2: Designing and Developing the Tutorial

The project became a collaboration leveraging the expertise of staff members from four different library departments: the health sciences subject librarian, the library's web programmer, an assessment and user services librarian and an instructional support specialist.

The principles of Keller's ARCS model[4] were considered as the process began. The goal was to make the tutorials stimulating enough to catch the students' **A**ttention, be **R**elevant to the students' curriculum, give them **C**onfidence that they were answering the questions correctly based on what they had learned, and have **S**atisfaction with the experience by receiving on-going feedback, quiz scores, and a final assessment.

GSU's web programmer began by setting up a pilot of the 'out of the box' University of Arizona application on the library's test server, creating a sandbox-style evaluation space. The first issue encountered was frame busting, an issue which Schmidt and Hartman had warned about in their review. Links set to open web pages in a new window covered the GOTS navigation pane, making it unusable. Because the library website is hosted on WordPress by the university's Public Relations/Communications Department, web design changes are restricted. Internal links that *could* be changed had the target attribute set to open in the same frame as was clicked on.

After a short evaluation period of the capabilities of the application, the web programmer began skinning the interface with GSU's own custom theme. Revisions of the theme were undertaken over several months. The color scheme was changed to match the branding of GSU's "visual identity." The GSU logo was added and the footer customized to add the GSU name. The text of the quiz instructions was rewritten to be more relevant to GSU and the post-quiz email

text was customized. The tutorial's "next" and "previous" arrows were restyled and moved from the tutorial body to the footer so they would remain in the same place on every page. The graphic style of the contents buttons was changed from "hamburger" style to a button labeled "Contents."

After the front-end customizations were satisfactory, some back-end customization was needed for the guide's WYSIWYG editor, as the editor lacked buttons for underlining, centering text, and numbered bullet points. These were added by modifying settings for the TinyMCE editor included with GOTS.

The librarian created the side panel navigation script, writing the interactive exercises and quiz questions for a "Basic Searching in PubMed" tutorial. The database, themes, and entire GOTS instance were cloned to a production server prior to usability testing.

The library's Instructional Support Coordinator reviewed the tutorial. Her experience with creating tutorials for freshman learning communities led to simplification of the language used in the instructions. She also made the graphics more relatable by using the GSU school mascot as an indicator of when a student needed to perform a function in the tutorial. As the project progressed, it became obvious that once a GSU-branded template was created, a user-friendly and reliable GOTS template could be replicated for other GSU librarians to use for their own subject assignments.

Phase 3: Creating and Analyzing the Usability Study

The purpose of the usability study was to gauge users' perceptions of overall ease-of-use of the GOTS format and its appeal as a learning tool. With scripted questions and verbal follow-up,

users were asked about navigation, content, and stumbling blocks particular to the PubMed tutorial. Five GSU students were recruited by the Assessment and User Experience Librarian to participate in a usability study. Although this number may seem small, usability experts Jakob Nielsen and Thomas Landauer recommend testing with no more than five users, because five users can uncover 85% of the problems with a website.[5]

The Assessment and User Experience Librarian met with each student individually to complete the usability study. All subjects were asked the same questions. The librarian encouraged subjects to verbalize their thoughts and ask questions during the study. Students were informed that although the sample tutorial was designed for health sciences students, the intention was that subject librarians would create tutorials for students in all disciplines, as well as the freshman learning communities. Because the grade-level range that the tutorial needed to cover was so broad, it needed to be both understandable by freshmen and not condescending to graduate students. The students were also told that after completing the quiz, a completion certificate would be emailed to the librarian and/or course professor to confirm students had viewed the tutorial and received a passing score.

Critically, none of the subjects had used PubMed before. The students were of the following class levels and majors: Graduate (PhD) in Communication, Senior in Managerial Science and Computer Information Systems, Junior in English, Senior in Social Work, and Sophomore in Computer Science.

The Assessment and User Experience Librarian asked students the following questions about the functionality and navigation of the tutorial: Was the navigation of the tutorial intuitive? Did they use the Contents Box at the top? Did having a "live" website to work in make the tutorial more interesting than a static one? The content of the tutorial was also assessed with

questions such as: Did any of the concepts, such as MeSH, not make sense? Did the searches you were asked to do work? Was the language and terminology used in the tutorial understandable? Were the graphics used in the text part of the guide helpful? Did you read the text as you went along? Was the organization of the tutorial effective? Was the amount of time the tutorial took too long or an appropriate length for subject?

Representative 'take aways' from the user study are summarized below:

- Avoid using PubMed jargon like "automatic term mapping" and "automatic explosion" unless these terms are necessary for successful use of PubMed. (A student commented, "Automatic explosion sounds weird. Is this a science thing?")

- One subject said he skimmed the sections Narrowing Your Search Results and Getting Full Text Articles because most of it was "basic computer stuff."

- Break up the steps using bulleted or numbered lists.

- Students suggested adding more screen capture graphics within the tutorial, so users know what to look for on the live site.

- One said he was reading carefully because he knew there would be a quiz.

Sample responses to the question, "How was the tutorial overall?" are included in the following:

- "I'm not a medical expert. It was ok. Dry, but how can it be exciting?"

- "A lot of big, scientific words. Everything was understandable, but I'm not familiar with the science words."

- "A lot of acronyms and abbreviations (PubMed, NLM, MEDLINE, EBSCO)."

- "Can I get my score? Kind of weird I can't see my results before I give my email address. Maybe provide instructions that say once you email the results, you'll see your score."

- Two subjects reported that they started skimming towards the end of Building a MeSH Search due to the length of the section. One subject said he went back and re-read part of this section to make sure he understood it.

Students stated that they appreciated having the quiz questions at the end of each section to reinforce what they had just read. Mestre notes the importance of ongoing interactive feedback, and suggests librarians "use frequent checks, such as periodic multiple choice questions. Include scenarios or simulations that require an action with periodic questions that require a response from the student."[6] Schmidt and Hartman reported that students appreciated receiving "immediate feedback on their answers, which provides a knowledge check and/or course correction."[3]

Based on the comments and suggestions from the student test sample, the librarian chose to separate the tutorial into independent Basic and Advanced PubMed tutorials. As Mestre says, "splitting longer or more complex content into small segments and arranging content in logical sequences also help reduce content-related memory load in multimedia tutorials."[6] More images and screenshots were added and text revised to bullet points. Additionally, emphasis was placed on the information specific to PubMed, leaving out information common to most web-based applications.

Phase 4: Piloting and Sharing the Code

After the revised template was finalized, the University of Arizona issued an upgrade with a pop-up window option to use with frame-busting databases or websites, fixing Schmidt and Hartman's concern. The librarian and web programmer created a second template. The new

template instructions directed the student to resize their browser window to make room for the pop-up window. Unfortunately, changes made to the WYSIWYG editor must be replicated manually with each upgrade.

To help other librarians create their own GOTS tutorials, GSU library-branded templates were created for the pop-up and static window versions. Graphics were made available to download in an internal research guide. Librarians created a tutorial on how to use GOTS and gave a presentation to educate other librarians on how to use the system. Once logged into the GOTS administration interface, librarians may create new tutorials from the template and change the text as they choose.

OUTCOMES

The GSU librarians have found that GOTS, an open source tool, is much more user-friendly than Camtasia or Captivate software, potentially reducing institutional costs for licenses. In fact, the only expense related to using Guide on the Side is human labor. Tutorials and templates can be easily updated, eliminating laborious revisions of recorded videos. GSU library faculty now have a tested template they may use to create tutorials for their own subject disciplines.

Other tutorials for learning basic library skills like catalog searching may now be created with the pop-up window upgrade. Tutorials for Advanced PubMed searching and Cochrane Library were created and are in use. Student assessment and promotion of the tutorials is on-going. A future project will be a non-course-specific tutorial that guides students through using a database to search for their own topic, as discussed by Sult and colleagues, which will allow

students to, "understand both the mechanics of database searching as well as the more complex and critical thinking that goes into constructing and executing an effective database search."[2]

One of the most important outcomes of the process is that the web programmer placed the code on an open source platform at <https://bitbucket.org/gsulibwebmaster/gsu-guide-on-the-side-theme> available for anyone to use.

CONCLUSION

The collaboration among library faculty and staff was essential to creating an effective platform for subject librarians to deliver active-learning instruction. GSU librarians now have an additional teaching method available if they are unable to schedule face-to-face time with students: two branded GOTS templates – one with a pop-up window, one without.

The health sciences librarian is planning a meeting with the Department of Academic Affairs for the health sciences disciplines to discuss implementing comprehensive online instruction in information literacy. One advantage of online training is having less impact on instructors by not taking up part of their valuable class time. Another is that GOTS also allows librarians to focus more on other tasks, such as reference work, personal consultations, outreach, and creating more tutorials. Finally, since students are able to go back and review the material, see their quiz scores, and take the tutorial again if desired, their understanding and retention of the material may improve.

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