Histology Impact Grant Project Plan

3/22/2011
Faculty Programs Team, Learning Technology; Histology Impact Grant
Executive Summary

The project goal is to develop a comprehensive and customizable educational resource featuring online, digital histology content complete with interactive lecture modules, a pre-laboratory and a virtual laboratory experience. The resource will be accessible by laptop/netbook computers with Internet access and may be offered as a blended learning component or a stand-alone histology course to promote learning at any time or place.

The resource will include interactive and customizable digital lectures and laboratory modules with specific objectives to promote maximum engagement by undergraduate, graduate, and professional students at OSU, with the potential of reaching over six hundred students per quarter. The pre-laboratory will feature a series of short video demonstrations of virtual slides presented by the instructor. Pre-lab modules are designed to mimic valuable, one-on-one student-instructor interactions in wet-laboratories, a component of histology education that is severely lacking in the OSU Medical and Dental histology courses. The virtual histology laboratory utilizes a computer application that simulates the examination of tissue slides under a microscope. Using this emerging technology and guided by structured laboratory objectives, students will move the virtual slide around and zoom in or out to study histology.

To ensure students’ engagement in the learning process, intermittent and post-module quizzes will be presented throughout the lecture, pre-lab and lab sessions, each with instant feedback. With the proposed resource, a single instructor may reach more than a thousand students in a year without sacrificing any aspect of knowledge transfer, thus significantly increasing faculty efficiency.
Problem / Opportunity
Histology is a fundamental course that is not typically offered to undergraduate students interested in pursuing careers in science. The main reason is the highly time consuming and visual nature of histology requires long instructor-student contact hours and course resources that are costly and difficult to maintain. Currently, there is a large demand by undergraduate students at the Ohio State University and other undergraduate institutions for introductory and advanced histology courses.

Unfortunately, there is no introductory undergraduate human histology course and only two advanced histology courses with limited seats offered each year at OSU. Students in professional school who have taken undergraduate histology courses perform significantly better in integrated science courses than their peers that don’t have such an opportunity. Additionally, histology courses taught to medical and dental students at OSU offer didactic lectures but no laboratory components. The lack of a laboratory experience leaves an enormous gap in comprehensive understanding and appreciation of microscopic human anatomy resulting in lower exam performance compared to a cohort exposed to the laboratory experience.

By creating a comprehensive and customizable educational resource featuring online, digital histology content complete with interactive lecture modules, a pre-laboratory and a virtual laboratory experience, students at Ohio State will have an opportunity to have access to a stand-alone histology course or blended learning modules in related courses at OSU.

Project Goal(s)
The main goal of this project is to make histology education complete and available to wide audience by:

- Developing a completely online histology course appropriate for undergraduate students.
  - Using Quality Matters as a general guide.
- Developing online pre-lab modules and objective-driven virtual laboratories available to the medical, dental, graduate, and veterinary students as ancillary course material to enhance histology mastery.
- Establishing a centralized online histology educational resource for instructors at OSU.
- Making teaching and learning histology more effective and efficient for instructors and students.
- Enhancing students’ foundational science knowledge as the result of firm histological understanding.
- Creating a highly ranked histology resource via Internet search results.

Project Objectives
At the end of this project, we will have:

- Secured a dedicated domain for a public-facing website: http://histology.osumc.edu/.
- Produced a public-facing website containing general histology resources.
- Used Human-Computer Interaction research to determine the best structure and layout for the public-facing website.
  - The investigators will use user-centered philosophy in creating the website design.
  - The investigators will implement iterative evaluations to improve functionality and performance throughout the grant time period and beyond.
- Produced a comprehensive, private website (via Shibboleth) containing histology teaching and learning resources, navigable via Carmen.
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- The content will feature three main digital components for complete on-line histology courses customizable for individual students or instructors and based on students’ interest and educational levels.
  - Created metadata structure for categorizing slides and content information.
  - Produced histology content that includes interactive lecture modules, a pre-laboratory experience, and a virtual laboratory experience.
  - Created a Carmen course hub to house resources and modules for distribution to related courses (e.g., Dentistry, Vet Med).
    - The digital lecture component will consist of a series of histology lectures with specific objectives in various file formats including PPT, PDF, or as a voice-synched video and caption using Camtasia.
    - Pre- and post-quizzes, with instant feedback, will be incorporated into each lecture modules to ensure content mastery.
    - The pre-laboratory will feature a series of short video demonstrations of virtual slides presented by the instructor using Camtasia.
  - Produced a virtual histology lab that simulates the examination of tissue slides under a microscope.
    - Tissue slides will be categorized by tissue type and organ system.
  - Produced laboratory objectives (e.g., find a particular cell or structure).
  - Created conditions of acceptable levels of competency.
    - Once an objective is completed at a certain threshold, a student can proceed to the next objective.
  - Purchased Zoomify for interactivity with high-resolution imagery.
  - Produced intermittent and post-module quizzes for lecture, pre-laboratory, and laboratory sessions.
    - Testing modules will feature instant feedback after each question and provide explanations for the correct and incorrect answers.
    - All three components (lecture, pre-lab, and lab) will feature intermittent and post-module multiple-choice questions to ensure student engagement and mastery.
  - Placed the public-facing website into top search engines (e.g., Google, Yahoo) via metadata to aid search results.
  - Completed the CITI program (https://www.citiprogram.org/Default.asp?).
  - Completed the IRB Exempt form (http://orrp.osu.edu/irb/exempt/index.cfm).
    - Student outcome evaluation will measure student satisfaction and exam performance
      - Factors will include student learning, content richness
    - Student evaluation and scores from 2010 will be used as a control group
      - Human Computer Interaction scale will measure satisfaction with interface design.
      - Instructors will report satisfaction and efficient use of time.
**In-Scope**
- Content for all modules will be produced by the Histology instructor.
- Creating a comprehensive histology educational website, allowing public access to limited items.
  - Educational website is constructed as a general resource with limited material and functionality, not for-credit.
- Using Carmen to package and deliver a for-credit stand-alone course and independent modules.
  - Includes lecture, prelab modules, objective-driven virtual lab, and assessment (pre, post quiz activities and grad reporting).
  - Creating a resource hub with packaged modules that can be provided to related courses (e.g., Dentistry, Vet Med).
- Hiring a website designer to create public-facing course and Carmen course homepage.

**Out-of-Scope**
- Hiring a programmer to provide increased functionality and interactivity to the public-facing site.
  - NOTE, a programmer will be consulted and a development plan will be made for integration of increased functionality and interactivity outside the scope of this project.
- Creating a mobile application to access course materials, or ensuring course materials are accessible via iOS devices.
- Creating a course experience accessible by iOS (e.g., constructing experience without the use of Flash technology).
  - NOTE, Zoomify requires Flash.
- Conducting a full scale Human-Computer Interaction research project in Medical, Dentistry, Vet Med, and Vertebrate histology courses.

**Success Criteria**
- A public-facing histology resources website is successfully launched and is easily found through common histology key terms search.
- An on-line virtual histology resource hub website is successfully launched and contains fully functioning lecture modules, pre-lab instructions, and a virtual histology laboratory for currently existing courses, enabling an increase in enrollment.
- A completely stand-alone introductory histology course for OSU undergraduate students is ready and available for enrollment and participation by students anywhere.
- Pre-lab and virtual-lab modules are available to the medical, dental, and veterinary students at the OSU via a Copy Course Components procedure whereby instructors copy relevant content from the resource hub into their courses.
- [http://histology.osumc.edu/](http://histology.osumc.edu/) is a top online search result when searching with histology key terms.
- Histology and related-fields instructors report satisfaction and efficient use of time with using the online histology resource hub and its modules.
- Students' exam performance equals or exceeds historical data while using the online histology resources and course.

**Project Assumptions**
- Hosting on BioMedical Informatics (BMI) server will provide 99.999% up time.
- BMI’s server will allow expanded site functionality moving forward.
- Carmen will provide 99.999% up time.
### Projects Risks

<table>
<thead>
<tr>
<th>Risk Description</th>
<th>How Likely 1=low 2=med 3=high</th>
<th>Impact 1=low 2=med 3=high</th>
<th>Score likely x impact</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logistics involved in establishing a designated server may potentially cause delay</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>1. Already established a designated server for testing.</td>
</tr>
<tr>
<td>Zoomify not working properly</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1. Contact Zoomify at 831.420.0400 or <a href="mailto:support@zoomify.com">support@zoomify.com</a></td>
</tr>
</tbody>
</table>
| Shibboleth is not working properly to shield for-credit resources from public view| 2                             | 3                         | 6                     | 1. Refer to [https://webauth.service.ohio-state.edu/~shibboleth](https://webauth.service.ohio-state.edu/~shibboleth)  
2. Work with local BMI experts (Chris Fish, Aaron Ringle, Tremayne Smith)      
3. Contact Scott Cantor                                                           |

### Obstacles / Constraints
- Po-Yin, the Human Computer Interaction researcher, has class and other obligations competing for her time.
  - Po-Yin is coordinating interviews with students to assess web design/interface.
- Daniel Jensen, the IT liaison, has other BMI-related projects that compete for his time.

### Schedule Considerations / Other Projects / Related Projects

#### Histology
- Lisa Lee out of town for conference (3/12-3/23), but will be in contact via cell phone and access to work computer via Citrix.
- Lisa Lee is working on an NSF grant due in July.
- Lisa Lee is attending a conference in Mid-July, but it is in Columbus.

#### LT
- Statistics Impact Grant
- eLearning Professional Development grants
- Innovate! (April 25-29)
- Deans and Chairs projects
- CIC conference planning
### Project Milestones and Major Deliverables

<table>
<thead>
<tr>
<th>Milestone/Deliverable</th>
<th>Target Week</th>
<th>Responsible</th>
<th>M/D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secure domain space</td>
<td>2/11/11</td>
<td>DJ; LL</td>
<td>D</td>
</tr>
<tr>
<td>Consult with WAC/ADA expert</td>
<td>2/15/11</td>
<td>LL, RG</td>
<td>M</td>
</tr>
<tr>
<td>Receive quote from web developer</td>
<td>2/28/11</td>
<td>LL, RG</td>
<td>M</td>
</tr>
<tr>
<td>Hire web developer</td>
<td>3/7/11</td>
<td>LL, CG</td>
<td>M</td>
</tr>
<tr>
<td>Complete CITI course</td>
<td>3/7/11</td>
<td>PY</td>
<td>M</td>
</tr>
<tr>
<td>Submit exempt IRB form for Human Computer Research</td>
<td>3/10/11</td>
<td>LL</td>
<td>D</td>
</tr>
<tr>
<td>Create public-facing website wireframe</td>
<td>3/28/11</td>
<td>CG, LL</td>
<td>D</td>
</tr>
<tr>
<td>Chris Premanandan receives training on Camtasia</td>
<td>3/28/11</td>
<td>CP, RG</td>
<td>M</td>
</tr>
<tr>
<td>Recruit students for interview and focus groups</td>
<td>3/28/11</td>
<td>LL</td>
<td>M</td>
</tr>
<tr>
<td>Needs assessment: sample student recruitment efforts to review wireframe samples</td>
<td>4/4/11</td>
<td>LL, RG, CG, PY</td>
<td>M</td>
</tr>
<tr>
<td>Purchase Zoomify account</td>
<td>4/4/11</td>
<td>LL</td>
<td>M</td>
</tr>
<tr>
<td>Initial draft of metadata structure of slides completed</td>
<td>4/4/11</td>
<td>LL</td>
<td>D</td>
</tr>
<tr>
<td>Consult with QM (Quality Matters) expert</td>
<td>4/11/11</td>
<td>LL, RG, JT</td>
<td>M</td>
</tr>
<tr>
<td>Determine metadata structure for resources on website</td>
<td>4/11/11</td>
<td>LL, RG, PY</td>
<td>M</td>
</tr>
<tr>
<td>Carmen resource hub space shell created</td>
<td>4/11/11</td>
<td>RG</td>
<td>D</td>
</tr>
<tr>
<td>Carmen online histology course shell created</td>
<td>4/11/11</td>
<td>RG</td>
<td>D</td>
</tr>
<tr>
<td>Student worker (Vinny Balzano) completes Website building and hands it over to Cindy to upload onto the server</td>
<td>4/11/11</td>
<td>VB</td>
<td>D</td>
</tr>
<tr>
<td>Digitally scanned Veterinary Histology tissues and completed</td>
<td>4/18/11</td>
<td>LL, GAs</td>
<td>D</td>
</tr>
<tr>
<td>Virtual laboratory site (public facing site) is completed</td>
<td>4/25/11</td>
<td>LL, CG, DJ</td>
<td>D</td>
</tr>
<tr>
<td>Meta data added to public-facing website</td>
<td>4/25/11</td>
<td>LL, CG</td>
<td>D</td>
</tr>
<tr>
<td>Virtual lab is piloted in Anatomy 700</td>
<td>4/25/11</td>
<td>LL, DS</td>
<td>M</td>
</tr>
<tr>
<td>Laboratory objectives produced</td>
<td>4/25/11</td>
<td>LL, CP</td>
<td>M</td>
</tr>
<tr>
<td>Create HCI survey and focus group questions</td>
<td>5/2/11</td>
<td>LL, PY</td>
<td>D</td>
</tr>
<tr>
<td>Shibboleth authentication protection completed for for-credit resources</td>
<td>5/23/11</td>
<td>DJ</td>
<td>D</td>
</tr>
<tr>
<td>Interview or focus group for public-facing website functionality</td>
<td>5/30/11</td>
<td>LL, RG, CG, PY</td>
<td>M</td>
</tr>
<tr>
<td>Meeting with Classroom Media Distribution for streaming videos</td>
<td>6/6/11</td>
<td>LL, RG</td>
<td>M</td>
</tr>
<tr>
<td>Constructing 21 lecture modules to begin. Two modules per week from 6/6-8/15. A lecture module shall be composed of 15-20 minute subsections (each with intermittent quiz) and a post-module quiz. Content is already completed and available</td>
<td>6/6/11</td>
<td>LL, KF, VB</td>
<td>M</td>
</tr>
<tr>
<td>Recording pre-lab video demonstrations to begin. Three to four 5-minute pre-lab video demos should be completed from 6/6-8/15</td>
<td>6/6/11</td>
<td>LL, KF, VB</td>
<td>M</td>
</tr>
</tbody>
</table>
Populating virtual lab for OSU students to begin. Same Zoomify slides as public lab but with objectives and text descriptions for each image. Objectives and text descriptions are available already 6/6/11 LL, KF, VB M

Edit public-facing website functionality based on interview or focus group feedback 6/13/11 LL, CG D

Conditions of acceptable levels of competency are created 6/13/11 LL M

Chris Premanandan receives training on Carmen 6/20/11 CP, RG M

10 lecture modules completed. Half way completed with lecture modules 7/4/11 LL, KF, VB M

15-20 pre-lab video demos should be completed. Half way completed with pre-lab video demos 7/4/11 LL, KF, VB M

Check-in point for progress with populating virtual lab content to OSU student site 7/4/11 LL, RG M

Submit IRB form for Autumn Term pilot 7/11/11 LL D

21 lecture modules completed 8/15/11 LL, KF, VB M

30-40 Pre-lab video demonstrations completed and on streaming server 8/22/11 LL, KF, VB M

Virtual lab completed for OSU students 8/15/11 LL, VB, KF M

Digital lectures completed 9/5/11 LL, CP D

Carmen course hub completed 9/5/11 LL, RG D

Online Histology course in Carmen completed 9/5/11 LL D

All course experiences completed 9/12/11 LL M

Large scale pre-experience assessment implemented in Med, Dent, Vet Med, undergrad and grad histology courses 9/26/11 LL D

Large scale post-experience assessment implemented in Med, Dent, Vet Med, undergrad and grad histology courses 12/5/11 LL D

Impact Grant support from Learning Technology concludes 12/26/11 LL, RG M

Assessment and project report (with Dean/Chair support letter) due 1/30/12 LL, RG D

**Courses Impacted**
- Vertebrate Histology (EEOB) 630
- Anatomy 700
- Anatomy 712 (Medical Gross Anatomy- histology is integrated)
- Vet Med 530 & 531
- Dental Anatomy 601 & 602
Project Resource Summary

Histology

- $7,500+ for processing fees, pathology core lab equipment usage fees, digitizing tissue slides fees, faculty release time for Lisa, Po-Yin, and Chris, as well as contributor time from David and Dan.

LT

- Undergraduate/Graduate student hourly fees ($8.00/hr; $5,400)
- Purchase Zoomify license ($450)
- Purchase dream weaver ($150)
- Web site designer ($2,500)
- Support costs ($3,500)
- Conference fees ($3,000)

Histology total: $7,500+
LT total: $15,000