BRIEF COMMUNICATIONS

"Genomics and Translational Medicine for Information Professionals": an innovative course to educate the next generation of librarians*

Ana D. Cleveland, PhD, AHIP; Kristi L. Holmes, PhD; Jodi L. Philbrick, PhD

See end of article for authors' affiliations.

INTRODUCTION

Technological advancements in the biosciences and clinical care have motivated libraries to embrace a model that welcomes librarians with specialized training and expertise to serve the changing information needs of their patrons. To educate the next generation workforce to meet the demands of the changing health information environment, the faculty of the Health Informatics Program in the Department of Library and Information Sciences (LIS) at the University of North Texas (UNT) College of Information developed a web-based, three-credit hour, graduate-level course, "Genomics and Translational Medicine for Information Professionals." The Health Informatics Program, one of the master's degree programs of study, prepares students to work in health-related information environments, and it is ranked third in the nation by *U.S. News & World Report* [1]. The five-week course, taught in the summers of 2010 and 2011, was created through a collaboration of the Health Informatics Program faculty and a bioinformaticist from the Bernard Becker Medical Library at the Washington University School of Medicine in St. Louis, Missouri.

BACKGROUND

The concept of specialty information services in libraries is not new [2], and libraries have changed to meet information needs in impressive ways. Several successful library-based bioinformatics support programs have been established [3–5], and a number of libraries [6] provide specialty information services [7, 8] that extend beyond bioinformatics to clinical, consumer health, genomics, and community outreach efforts. The specialty informationists in these programs provide consultation services, information searching and support, and training opportunities

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 Supplemental Table 2 is available with the online version of this journal.

and work hand in hand with their diverse patron groups in a variety of capacities.

Biomedical research and clinical care have experienced a considerable evolution in recent years. Major technological advances in basic research and health care, combined with the increasing influences of individualized medicine and translational science, challenge the traditional library support model and provide new ways that libraries can become integrated within their organizations. Translational science efforts are often facilitated in large part as a direct result of the Clinical and Translational Science Awards (CTSA). These awards are made to institutions, and they aim to "transform the way biomedical research is conducted [by accelerating] the translation of laboratory discoveries into treatments for patients, [engaging] communities in clinical research efforts, and [training] a new generation of clinical and translational researchers" [9]. There are sixty CTSA centers, and they work in collaboration with each other and within their own organizations to forge partnerships and promote efforts to efficiently and effectively improve research and clinical care to positively impact human health. Library-based support of translational initiatives is not limited to the research or clinical realms; indeed, libraries are supporting such diverse activities as tracking and evaluation, data management, researcher networking, team science, community outreach, and education and training, to name but a few.

The dedication of libraries to support these and other efforts necessitates a better understanding of these topics and an awareness of the role that libraries can play in this arena. However, for libraries to develop support services, librarians need to have a basic understanding of the field and relevant issues for different patron groups. While there have been significant efforts to train librarians for specialized support through Medical Library Association continuing education opportunities [10] and other efforts [11, 12], to date, there has not been a course in a school of library and information sciences that is targeted toward training emerging librarians to prepare them for supporting areas such as genomics and translational medicine upon graduation.

DEVELOPMENT

Based on the changing role of medical librarians in genomics and translational medicine, the Health Informatics Program faculty moved forward to offer a course in this area. The faculty researched course offerings in genomics and translational medicine at other institutions of higher education to formulate ideas about the course content. It was essential to identify an individual who had expertise in genomics and translational medicine, understood the role that health information professionals have to play in this arena, and had prior teaching experience. The faculty used the Medical Library Association's Educational Clearinghouse of courses to identify and select the instructor for the course.

The Health Informatics Program faculty brought expertise in course design and delivery, and the

Table 1
Course assignments and activities

Activity	Description
Weekly article response and comment	Each week, students were required to consume assigned material from various sources and of various types (web-based information resources, YouTube videos, online tutorials, peer-reviewed literature) and answer discussion questions. Their responses were to include a description of the relevance of this information to library and information sciences. Students were also asked to comment on other students' posts to promote communication and collaboration in the online course.
Weekly "Informatics in Practice" discussion post	Each week, the instructor posted a description of the work she was doing in her role as a bioinformaticist in her library. These postings offered students the opportunity to learn about real, library-based efforts related to topic areas discussed in class. Students were required to respond to the post with their thoughts, opinions, and questions on the topic.
Required core readings	The core readings provided the students with background knowledge on the subject area, and the students were required to read the documents prior to completing their weekly assignments.
Chats	The chat sessions offered students an opportunity to ask questions, get clarification on a topic, and introduce new ideas. The chats also provided a forum for guest speakers who are involved in various roles in Clinical and Translational Science Awards institutions.
Final project	The final project gave students the chance to learn about genomic information as it relates to a disease of their choosing. The final project was composed of three objectives: understand the background on the disease, perform an evaluation of information resources about the disease, and apply information in real-life situations. The background on the disease consisted of a definition, statistical information, diagnostic tests, clinical studies, institutions and organizations that are conducting research on the disease, and funding agencies or organizations. Students were required to evaluate resources targeted to patients and their advocates, clinicians, and bench researchers. For the final section of the project, the students discussed how they would deliver information services to patients and their advocates, clinicians, and bench researchers.

instructor brought subject expertise in genomics and translational medicine. Working together, the course objectives and requirements were written, and the instructor developed the content for the lectures. The course content was inserted into the template created by the Health Informatics Program faculty that is standard for all web-based health informatics courses taught in the online course management system, Blackboard Vista. Once the course was developed, a marketing campaign was conducted inside and outside of UNT LIS, with postings sent to the MEDLIB-L and UNT LIS student email discussion lists. The course was open as an elective to all Health Informatics Program students and did not have any prerequisites.

COURSE DELIVERY

The web-based course, primarily asynchronous, was delivered over a five-week period, with each week concentrating on a different focus area across basic concepts in genomics and personalized medicine, basic bench science, the clinical environment, consumer health issues, and translational medicine and the library. The instructor guided the students from one topic to the next, emphasizing similarities and differences across the various stakeholder groups. This course structure allowed students to understand the different stakeholders they may serve as well as provided a better perspective of the workflow at a biomedical research institution and the influence of translational medicine in the environment. The five areas of focus highlighted genetics and genomics, and instruction emphasized practical services and resources that can be successfully offered in libraries by librarians with very diverse educational backgrounds and expertise.

An introduction to each weekly focus area was presented via a PowerPoint lecture. The weekly assignments were structured around the focus area for that week and consisted of activities designed to engage the students in a meaningful way to better facilitate a rich learning experience. In addition, live, synchronous chats featured experts in the field of genomics and translational medicine. Table 1 provides an overview of the course assignments and activities with descriptions. To gain the necessary background information on the subject area, the students had a list of required core readings (Table 2, online only).

EVALUATION

Fourteen graduate students took the course in summer 2010, and nine graduate students took the course in summer 2011. The majority of the students who took the course were enrolled in the master's program; however, there were some post-master's students pursuing a certificate of advanced studies in health informatics enrolled in the course. Every semester, UNT conducts a formal assessment of teaching through the Student Evaluation of Teaching Effectiveness (SETE) survey. According to SETE results for both semesters, the instructor was rated as "highly effective," which is the top category.

In addition to the formal evaluation method, the Health Informatics Program faculty followed up with the first class of fourteen students four months after they took the course to obtain their informal feedback. Each student received four questions via email, including: (1) What did you find most useful about the course content? (2) Have you been able to apply or use any of the information you learned in the course in either your professional or personal life? (3) Are there any areas that the course did not cover that you would like to see included in the future? (4) Do you have any general comments that you would like to share about the course, including major lessons learned about genomics and translational medicine? All fourteen students responded to the message, and their comments were overwhelmingly positive. They found learning about genomics and translational medicine concepts and information resources extremely valuable. Some students mentioned that they were

able to apply the information in their professional lives to create research guides, perform literature searches, provide reference and instructional services, and share knowledge with coworkers. In addition, several students reported that they shared information resources from the course with family and friends to address health-related issues. Generally, the students would have liked expanded coverage on searching genomic databases, which was incorporated when the course was taught the following year. The students commended the instructor for her content, organization, and enthusiasm for the subject area.

DISCUSSION AND CONCLUSION

The course has proved to be a successful component of the Health Informatics Program curricula. The students who took this course have been exposed to the role they can play in genomics and translational medicine in their future professional careers. Even though some of the students did not have a science background, they were able to master the course content and felt confident that they could start contributing in this area in many different ways. Specifically, the students were excited about the possibilities of being involved in the translational process of bringing information from the bench to the bedside. The instructor and health informatics faculty also made the students aware of available continuing education courses, so they could further enhance their knowledgebase upon graduation.

This collaborative initiative between a bioinformaticist at an academic health sciences library and faculty in a school of library and information sciences has extended beyond the classroom and sparked new scholarly endeavors. In addition, the bioinformaticist was able to share her expertise with a new audience of library and information sciences graduate students. Future plans for the course include teaching it every summer, expanding the number of chats, and increasing the instructor's interaction with the students. The instructor plans to provide students with ''quick-start'' strategies that they may use to quickly capitalize on the covered concepts once they join the workforce. In addition, the course will be open to all students in the master's program because the course content has proved to be of interest to a broader audience.

While practicing health information professionals have the opportunity to take the course, there are other ways to gain experience and knowledge in this area. The Medical Library Association has an inventory of continuing education courses in genomics and translational medicine. Another suggestion for practicing health information professionals would be to start a journal club or discussion group with colleagues and invite speakers across the translational spectrum for a dialogue.

The best way to capture the spirit of this course is to quote one of the students who wrote, ''A general comment that I'd like to make is simply that this course is important. This is a cutting edge topic, and as a new librarians going into the field, it definitely helps us to have this background knowledge and familiarity with the possibilities/opportunities.''

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AUTHORS' AFFILIATIONS

Ana D. Cleveland, PhD, AHIP, Ana.Cleveland@unt.edu, Regents Professor and Director, Health Informatics Program and Houston Program, College of Information, University of North Texas, 1155 Union Circle, #311068, Denton, TX 76203; **Kristi L. Holmes, PhD,** holmeskr@wusm.wustl.edu, Bioinformaticist, Bernard Becker Medical Library, Washington University School of Medicine, 660 South Euclid, Campus Box 8132, St. Louis, MO 63110; **Jodi L. Philbrick, PhD,** Jodi.Philbrick@unt.edu, Health Informatics Course Coordinator, College of Information, University of North Texas, 1155 Union Circle, #311068, Denton, TX 76203