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DEVELOPMENT AND EVOLUTION OF AN INFORMATION LITERACY COURSE FOR A DOCTOR OF CHIROPRACTIC PROGRAM

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ABSTRACT

The authors report on the development and evolution of a required one-credit course in information literacy for a doctor of chiropractic program. This experience can serve as a model for planning and designing information literacy courses for doctor of chiropractic and other graduate health sciences programs.

BACKGROUND

Information literacy (IL), a set of skills requiring students to “recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information” (American Library Association [ALA], 1989) is becoming increasingly important in today’s society, where library technological upgrades, the Internet, and the way individuals gather an ever-abundant amount of information has become more difficult and complex. As the trend toward evidence-based health care increases, it is essential for today’s health care providers to be able to locate and evaluate the evidence of which intervention(s) may be an effective treatment for a particular

condition. Evidence-based chiropractic (EBC) involves the same steps as evidence-based medicine (EBM); EBC is described as “actively seeking support for and improvement of chiropractic clinical practices through the integration of the best available research evidence, combined with clinical expertise and patient values.” (Haneline, 2007) Taking this into account, along with the fact that many regional and disciplined-based accreditation associations couple IL skills with other main outcomes for graduating students (Association of College and Research Libraries & American Library Association [ACRL], 2000), the administration at the Davenport campus of Palmer College of Chiropractic directed the library faculty to develop a one-credit

information literacy class to begin in the fall of 2002. The class would be required of all doctor of chiropractic (DC) students in the second term of a ten-term program. This article reports on the development and evolution of an information literacy class for a doctor of chiropractic program, in order to help others develop IL classes for graduate-level students.

Literature Search

A literature search in the chiropractic databases Index to Chiropractic Literature (ICL) and the Manual Alternative and Natural Therapy Index System (MANTIS) using the keywords “information literacy” OR “bibliographic instruction” yielded no results. A search in AMED, Alt Health Watch, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Academic Search Elite using the keywords “information literacy” OR “bibliographic instruction” AND chiropractic also yielded no results. The educational databases ERIC, Education Index, and EBSCO’s Professional Development Collection, along with the library information database Library Literature and the NLM MEDLINE database, were searched for any type of articles about information literacy or bibliographic instruction in the fields of chiropractic and health science, as well as medical school curricula in higher education. This search yielded no articles about a chiropractic information literacy course of any kind, and very few on constructing a class for a health science-related or medical school program. However, there was substantial information in the databases and from various Internet searches on creating courses for undergraduates, especially freshmen, at colleges and universities throughout the United States. Those examples were used as models, and the specialized health and chiropractic topics determined to be essential for Palmer’s DC program were incorporated.

DESIGN

Even with some basic models, designing the information literacy class presented challenges. Most of the models in the literature assumed a

very minimal knowledge of information literacy skills, but Palmer students’ widely divergent backgrounds contradicted that assumption. Students must have at least 90 undergraduate credit hours before being admitted into the Palmer DC program. However, many students exceed this minimum requirement, and have an undergraduate degree; some even have master’s degrees in other disciplines. The models in the literature also geared their instruction style to relatively small classes (generally no more than 40–50) to be held in electronic classrooms with one to two persons per computer. In the Palmer DC program, the initial classes consisted of approximately 250 students, divided into two sections. There were no electronic classrooms or wireless environments large enough to accommodate that many students, and scheduling and time factors made it prohibitive to have several small sections. Classes were held in a large lecture hall with an Internet connection for the instructor only, necessitating a lecture and demonstration style of class delivery.

The basic precepts of the *Information Literacy Competency Standards for Higher Education* (ACRL & ALA, 2000) were followed in developing the course objectives, along with the CCE (Council on Chiropractic Education) *Standards for Chiropractic Programs and Institutions* (2002). After compiling a list of chiropractic and health science topics specific to a chiropractic graduate-level program, lesson plans were designed based on the course objectives.

OBJECTIVES

Course Goals and Objectives

The course goals and objectives followed ACRL Information Literacy Standards 1–5, set forth in the *Information Literacy Competency Standards for Higher Education* (ACRL, 2000) and clinical competencies from Section 2.II.H4m and 8m of the *Standards for Doctor of Chiropractic Programs and Requirements for Institutional Status* (CCE, 2002). The broad course goal was to instruct students in the basic information competency skills that enable them

to become proficient in using information resources for academic success and lifelong learning. The course objectives stated the student should be able to: (a) determine information requirements, (b) locate and retrieve relevant information using a variety of sources, (c) evaluate, organize, and synthesize information in order to construct new knowledge, and (d) recognize legal and ethical information issues in order to avoid negative ramifications.

A brainstorming session resulted in a list of 20 chiropractic and health-related topics that could be taught in a doctor of chiropractic IL class. Discussion among library faculty narrowed the 20 topics to 12 weeks of lesson plans for the 15-week class. Each weekly lesson plan contained anywhere from one to nine objectives for the students to meet after the respective class period. Table 1 contains the topics for the original course and the objectives for each class session.

TABLE 1 — ORIGINAL COURSE OBJECTIVES, LISTED BY WEEK

	Topic	Objectives
1	Intro. to Information Literacy: what is it & why is it important?	<ul style="list-style-type: none"> Recognize that accurate & complete information is the basis for intelligent decision making
2	Formatting search strategies	<ul style="list-style-type: none"> Determine the information requirements of a research question, problem or issue Identify appropriate potential sources of information Identify the keywords of main concepts in the topic Identify appropriate strategies for selecting search terms Use search strategy combinations, operators, truncators, etc.
3	Location of library resources & services; understanding Palmer's library Web pages & online catalog; Library of Congress call number system	<ul style="list-style-type: none"> Be able to navigate the library Web site quickly & efficiently Identify different sections of the library Web site appropriate to finding different types of information Know the location of the major service points in the Palmer library Effectively use the library's online catalog to search for materials by author, title, keyword, or subject Understand the library's call number system & be able to find items in the library
4	PubMed database	<ul style="list-style-type: none"> Become familiar with PubMed, how it works, search strategies, and Boolean logic Know how to work with search results Become knowledgeable with the Actions & Features Bars & what each link provides Be able to use the sidebar to access PubMed Services like the MeSH Browser & Citation Matcher Be able to use the MeSH Browser to check subject headings & perform a PubMed search from that utility Become familiar with Link Out, Related Articles & other functions of PubMed

TABLE 1 CONTINUED

5	Governmental Web sites	<ul style="list-style-type: none"> • Recognize major federal government health links & be aware of the type of information the links provide • Be familiar with links at the National Institutes of Health (NIH), specifically the National Center for Complementary and Alternative Medicine (NCCAM) & the National Guideline Clearinghouse • Be familiar with the links at the National Library of Medicine (NLM) Gateway
6	EBSCOhost databases; Palmer Health Sciences Library (PHSL) ejournals	<ul style="list-style-type: none"> • Identify different types of databases that may be used to gather research • Select an appropriate EBSCOhost database for the information need • Be aware of how to use the Basic & Guided Search screens • Be familiar with the advantages & disadvantages of ejournals • Be familiar with elements most ejournals share
7	Chiropractic online resources; print indexes and reference resources at Palmer	<ul style="list-style-type: none"> • Identify periodical indexes that cover chiropractic journals & proceedings • Identify the types of information available in the chiropractic databases • Understand what print-based indexes are available & how to use them • Become familiar with library indexes for searching older literature • Identify & use different types of reference sources for finding general, health sciences, & chiropractic information
8	Internet search engines; health sciences & other specialized search engines; invisible Web	<ul style="list-style-type: none"> • Become familiar with strengths & weaknesses of major search engines in order to formulate more efficient search strategies • Understand how the World Wide Web is organized • Know what types of information can be found on the Web • Recognize the different parts of a URL • Select appropriate strategies for using search engines effectively • Be aware of the wide range of health sciences & other specialized search engines available • Know what types of health sciences information can be found on the Web • Select appropriate strategies for using health sciences search engines • Be aware of the invisible Web & know how to access information from it
9	Chiropractic online resources—Web sites	<ul style="list-style-type: none"> • Be aware of the Chiropractic Online Resources section of the library home page • Know what types of information can be found on the various chiropractic Web sites on the library Web site • Become familiar with the basics of the different chiropractic-oriented search engines
10, 11	Critical thinking issues; evaluation of sources	<ul style="list-style-type: none"> • Be able to critically evaluate all types of information including journals, Web sites, & other sources • Distinguish between popular & scholarly periodicals • Be able to identify the parts of a citation & the need for citing sources • Recognize bias in information sources
12	Social & legal issues in information	<ul style="list-style-type: none"> • Identify copyright, fair use, and public domain information issues • Understand plagiarism & ways to avoid plagiarism in class assignments

INSTRUCTIONAL CONTENT

Syllabus Construction

Syllabus construction followed Palmer's syllabus pattern. During syllabus creation, several major decisions concerning the course were made. Those included:

Selection of a textbook

Choosing an IL textbook was problematic, since it was difficult to find a work that did not target freshmen. Many of the lesson plans required handouts designed exclusively for the course. However, after reviewing several potential texts (Badke, 2000; Barclay, 1995; Branscomb, 2001; Gurak, 2001; Iannuzzi, Mangrum, & Strichart, 1999; Spitzer, Eisenberg, Lowe, & Doyle, 1998; Winters, 1999), Robert Berkman's *Find It Fast: How to Uncover Expert Information on Any Subject Online or in Print* (Berkman, 2000), a general work on information searching, was selected, because it addressed many of the topics to be dealt with in the class. It would also be a useful resource for the students in the future.

Grading Standards and Grading Scale

Final grades were determined from four sources: examinations, quizzes, satisfactory completion of online tutorials and assignments, satisfactory attendance, and answers to pop questions during attendance-taking. (See Table 2.)

TABLE 2 — GRADING SCALE

Grading Criteria	Points	Total
Attendance and pop questions (4)	5	20
Projects – tutorials (2)	15	30
Web Evaluation	15	15
Exercises (2)	5	10
Exercise (1)	10	10
Quizzes (2)	10	20
Midterm	15	15
Final	30	30
<i>Total Points</i>		150

Examination, Quiz, and Assignments

A considerable amount of effort was spent designing class handouts and assignments, writing class lectures with accompanying Microsoft PowerPoint presentations, and constructing test questions for the class. Custom-made handouts were designed for the majority of the classes, supplemented by appropriate articles on the topics and readings from the text when needed. Because of the large number of students, test-scoring software was used; consequently, test questions were multiple-choice and true/false to accommodate a mechanically scored answer sheet. The questions were designed from several different aspects, with at least one multiple-choice question and one true/false question per topic or class objective. Test questions came from notes of the class lectures, from assigned readings, and from the assignments. Additional test questions were added as the test was made, which created a file bank of over 100 questions for use in ParTest (the test creation software available at Palmer College).

The assignments were considered a vital part of meeting class goals. With large class sizes, outside assignments ensured that students would have hands-on experience with the databases. Three database assignments were designed: the first reviewed PubMed (MEDLINE), the National Library of Medicine's database to medical literature. The second concentrated on giving the students experience in Alt Health Watch, AMED, and CINAHL, and all EBSCOhost databases that index chiropractic literature. The third covered ICL and MANTIS. In addition to the database assignments, students were assigned a Web site evaluation worksheet created for use with the discussion on critical thinking and two online tutorials, one dealing with general searching and one focusing on searching specific to allied health topics. Each online tutorial had a hard copy worksheet which was graded.

EVALUATION/ASSESSMENT TOOLS

As instructors of a new course, the authors thought it was important to devise an

assessment tool which could be used to establish an entering and an exit point of student knowledge at the beginning and end of the class. A pretest and posttest were designed; these consisted of 11 opinion/informational questions asking students their perceptions of their information literacy skills, three questions asking for demographic information, and 29 knowledge questions covering some of the basic class objectives from the lesson plans. The posttest consisted of the same 29 knowledge questions from the pretest, and was presented during the last class session before final exam week. The objective of using these assessments was to measure students' prior knowledge and to identify problematic learning outcomes. After continued analysis, very little new information was learned from this assessment tool, so it was dropped after the third year of the class. It was felt that the pretest and posttest had shown that students grasped the basic concepts outlined in the course goals. These evaluation measures were intended to look for areas of weakness in the original goals and objectives. No large gaps were found in the posttest results, so the evaluation measures were dropped.

Besides the pretest/posttest tool, the students received a course evaluation survey during one of the final classes of the term. This survey, developed by the college Department of Institutional Planning, is given to all classes at the institution each term. It has general instructional questions, some specific to each class, and provides space for general comments by the students. In some cases these suggestions have been useful for course revisions.

There was only a three-month time period for the actual course design. Due to time limitations, the beginning trimester sessions were designed anywhere from a couple of hours to about a week ahead of presentation. The first term's classes were tightly structured, with definite expectations of what students should be able to do after each topic was presented. Because of the large class size (125+ in each of the two sections), the lack of a wired classroom or a wireless environment, and the availability of only two instructors for multiple sections of

the class, the presentation style was lecture with an accompanying Microsoft PowerPoint presentation or live demonstration of a database with instructor-prepared notes as a handout. Students were then given outside assignments to demonstrate they could apply the material presented in class. The authors estimated how long the written assignments would take the average student to complete and used the standard of one hour of outside work for each credit hour of the class. These assignments were part of the grading criteria along with the tests. Because of the large number of students, attendance for credit points was taken only four times during the term. Using the "one-minute paper" technique, students were asked to fill out and turn in an index card with their name, ID number, and a comment about material covered that day or an assignment just turned in. Important insights about course content were gleaned from those attendance cards, which sometimes helped in course revision.

RECOMMENDATIONS AND REVISIONS MADE

Course Content

In the first term, the instructors presented too much information; this was modified to get through the class sessions in a timely manner. Many students indicated in their feedback that they felt the class repeated basic information they had already learned, and they wanted more chiropractic emphasis. As a result, some of the "basic" Internet and searching information, such as the online tutorial on research basics (Purdue University, 2002), was eliminated. Lecture material about the databases was also revised to highlight advanced searching skills. Online chiropractic resources and the chiropractic and health science search engines were given more time. The "essential" information students should know was examined, which led to combining topics and presenting overviews in class. Table 3 illustrates how the objectives for the class on search engines were condensed from the initial presentation to the subsequent presentation.

TABLE 3 — COURSE SYLLABUS INFORMATION

<p>From the Initial Syllabus</p> <p>Class Description: Internet Search Engines—Overview Health Sciences and Other Specialized Search Engines The Invisible Web—what is it?</p> <p>Class Objectives: Become familiar with strengths and weaknesses of major search engines to formulate more efficient search strategies. Understand how the World Wide Web is organized or not organized. Know what types of information can be found on the Web. Recognize the different parts of the URL. Select appropriate strategies for using search engines effectively. Be aware of the wide range of health sciences and other specialized search engines available. Know what types of health science information can be found on the Web. Select appropriate strategies for using health sciences search engines. Be aware of the invisible web and know how to access information from it.</p> <p>From Subsequent Syllabus</p> <p>Class Description: Internet Search Engines—Overview Health Sciences and Other Specialized Search Engines</p> <p>Class Objectives: 1. Be aware of the invisible web and know ways to access information from it. 2. Become familiar with strengths and weaknesses of major search engines to formulate more efficient search strategies. 3. Know what types of information can be found on the Web. Select appropriate strategies for using either general or specialized search engines effectively. 4. Be aware of the wide range of health sciences and other specialized chiropractic-oriented search engines available.</p>
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Textbook

At the end of the first term, there was a good collection of instructor-prepared handouts for each of the topics covered. The class revisions changed the emphasis of the class, so the selected textbook was no longer a good fit. The instructors decided to compile their own textbook based on the handouts, Microsoft PowerPoint notes, and short readings from other sources. The custom-designed text has worked well, but it has been necessary to revise the textbook every two to three terms in order to keep it current with changing database technology and resources.

Gradable Items

Student reaction to the number of assignments and the number of items included in the grading criteria was somewhat negative. Since it was more important for students to work on database assignments, two planned quizzes were eliminated. The shifting of points from the quizzes to the database assignments was well received by the students.

Assignments

Written (graded) assignments were carefully and thoroughly written to cover mechanisms of how the database search engines functioned and how

different types of keyword or subject searches yielded different types of results. Feedback from the students indicated they appreciated the thoroughness of the directions. The assignments were designed so that the questions and answer blanks were embedded within the handout. Flipping through all the pages of the assignment in order to score each paper required 10 to 12 hours to score each assignment. That was a prohibitive amount of time for the instructors to invest. An answer sheet was developed to extract the student responses from the assignment handout, allowing for much speedier scoring, and cutting the time required to score the assignments by more than half.

Originally assignments were not returned to students after grading; however, students wanted to use the assignments as study tools for the midterm and final tests. Since search terms used in the assignments would be changed each term, cheating would not be an issue if papers were returned. This limited visits to the instructors' offices to only those students who had questions on class material or scoring.

Testing

After eliminating the quizzes, only the midterm and final were left as testing instruments. For the most part, the scores on each of these tests fell into a basic bell curve, which indicated a fairly valid testing instrument. However, feedback from students pointed to a high stress level related to the tests and their performance in general. Since the instructors' primary goal was to get students to use the resources, emphasis was placed on knowing where to go to find information rather than memorizing facts. Therefore, both the midterm and final tests were changed to open-book and open-note format the second time the class was offered. This seemed to alleviate some of the students' stress over class testing, but the bell curve still indicated the test instruments were valid.

Other Changes

Upon scrutinizing two years of the student surveys conducted at the end of each term, a basic theme emerged. Students recommended that the course be moved to a different term,

since the course load for second-term students at Palmer College is quite heavy. After careful consideration of the survey results and the curriculum as a whole, the Curriculum Management Team recommended the class be moved to the first term, meeting twice a week for the first seven weeks instead of meeting once a week for the full term. The duration of the class would be shortened, but the contact hours would remain the same. Therefore, in the spring term 2005, the course was taught to second-term students for the entire term using the old class schedule and to first-term students for the first half of the term with the new course timetable to transition the class to the first term. As a result of the schedule change, other changes were necessary. Three assignments and the midterm were eliminated, requiring a new grading scale. (See Table 4.)

More concentration was placed on chiropractic resources, advanced searching techniques in the databases, and evaluation of sources. Some students still indicated tht they found the content repetitious, but those comments were not as frequent, and, in general, scores on the assignments and the test did not support that claim.

Team-Teaching

The class currently has one primary instructor rather than being team-taught. This had been the plan from the inception of the course. The team-teaching approach of the first two terms allowed for different perspectives on class content and

TABLE 4 — NEW GRADING SCALE

Grading Criteria	Points	Total Points
Attendance and pop questions (4)	5	20
Tutorial	15	15
ICL/ MANTIS, Web Eval., & Pub-Med Exercises	20	60
Final	25	25
<i>Total Points</i>		120

presentation style. It also gave a newly hired team member a chance to become acclimated to the large class sizes and time to get familiarized with the chiropractic subject matter. In addition, the short design phase lessened instructors' stress by having two instructors prepare assignments, test questions, and presentations.

Test-out Option

With its recommendation that the course be taught in the first term, the administration encouraged the development of a test-out instrument to offer students. The specific requirements for a test-out, according to Palmer College's policy, are that the student "(h)ave successfully completed an equivalent course in pre-chiropractic studies with a grade "C" or higher;" and (n)ot have used that course to satisfy any requirement for admission to Palmer College of Chiropractic ...". (Palmer College of Chiropractic, Davenport, IA). One instructor informally surveyed fellow librarians at nearby undergraduate institutions that offered information literacy survey courses as to the number and type of questions for a test-out. With the accumulated advice, a test of 30 multiple-choice and true/false questions on general searching knowledge and library skills was created. The test contained no questions specific to chiropractic or medical subjects. Students needed a score of 24 or better to test out of the course. Fewer than 24 students have been eligible to take the test-out in each of the two terms it has been offered. Of that number, eight or fewer passed the test each time, which highlights the necessity for the course. Unfortunately, this small number of passing students has not allowed the class to move to a smaller, wired classroom.

The first-term curricular slot has worked well. Students are more receptive and enthusiastic. There is a concern that students coming back to school after long absences or international students for whom English is a second language might be left behind by concentrating on advanced searching techniques. It will take further evaluation to determine if this concern is legitimate.

CONCLUSION

As more survey results are acquired from students, discussion continues on improvements for the course. In converting to a wireless environment, the college could allow fewer written assignments if students were required to have laptops. Moving portions of the class to a Web-based format consisting of several self-paced modules may also be an option. This would present two challenges: accounting for the varied levels of students' expertise with databases (and technology in general) and finding the time to develop and maintain Web-based instruction.

Lessons Learned

As the class evolved, these are the lessons learned that would be applicable to anyone designing a graduate level information literacy course:

- Keep the number of objectives for each class session low—from two to four, no more than five. Trying to cover the amount of material necessary to address more than three or four objectives will result in shallow treatment of the subject matter. More is not necessarily better. After deciding the "essential" topics that a health sciences information literacy curriculum should include, cut that list to the bare basics. This may sound extreme, but keep in mind that it will take students longer than expected to assimilate the subject matter and longer than anticipated to do the activities.
- Keep to the main lesson points and keep repeating those main points throughout each class and the entire course.
- A textbook is not absolutely necessary unless the class is designed around the text. A few focused articles and instructors' notes may be more useful. Class time is better spent exploring pertinent resources and discussing their content.
- Be flexible. Being rigid in student expectations and assignment scoring creates

undue stress for students and instructors alike. The goal is not to create expert searchers, but effective searchers; students are not as interested in searching for information as in finding information. Remembering that will help keep the class focused on the essentials of getting good search results.

As accreditation bodies update their criteria, the authors believe it will become imperative that information literacy skills become incorporated in the curriculum. Hopefully, this model will give other instructors ideas to incorporate into other chiropractic classes, or a model for planning and designing information literacy courses for a doctor of chiropractic program or other health science programs.

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