Course-integrated Instruction in an Academic Health Science Library: a Comparison of Basic Science and Clinical Strategies

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Abstract:

In academic health science centers, students fall into two categories: those studying basic sciences, such as genetics, molecular biology and neurosciences, and those in clinical programs, such as nursing, dentistry and medicine. The databases used and strategies needed to find appropriate information are different for these two groups. Recent advances in evidence-based medicine (clinical) and molecular information (basic science) necessitate innovative database searching techniques, and as a result, innovative database instruction.

The University of Florida Health Science Center Library (HSCL) strives to offer course-integrated database and library instruction targeted to the specific information needs of both the clinical and research programs of the Health Science Center (HSC). This paper describes the differing information needs of clinical and basic sciences students at the HSC, and how the HSCL responds to students' needs through its bibliographic instruction programs. Clinical examples of innovative practice include instruction for nursing students (integrative literature reviews and quality filtering), and dental residents (classroom assessment and graded assignments). Graduating and remotely-located students from all disciplines are staying connected via Internet databases. The basic sciences are covered through instruction to biomedically-related Ph.D. students (targeting interdisciplinary and molecular research) and veterinary medicine research students (outside the curriculum). Future plans for additional innovations are also considered.

INFORMATION NEEDS OF CLINICAL STUDENTS

Clinical students need information on diseases, including treatment, etiology and prognosis. Bibliographic databases such as CINAHL and MEDLINE are appropriate, as are full-text book databases such as Stat!Ref. Information on new and older drugs is necessary for many of our clinical students and can be accessed in PDR and GenRX information databases and from the Food and Drug Administration website, as well as in International Pharmaceutical Abstracts, a bibliographic database. Other clinical students need information on health care providers and practice guidelines, both of which can be found in HealthSTAR. Still others are interested in ethical issues that are covered in BIOETHICSLINE. Advanced students doing research in clinical areas can benefit from Web of Science (WOS) to see who has cited older articles, Current Contents Connect (CCC) for the most recent articles in clinical medicine, and Dissertation Abstracts (DA) to see what dissertations have already been written in their area of interest. At the University of Florida Health Science Center, evidence-based healthcare is gaining interest. We are now teaching new techniques for locating the small fraction of medical articles reporting evidence that is applicable to clinical practice.

COURSE-INTEGRATED INSTRUCTION FOR NURSING STUDENTS

In 1996/1997, the College of Nursing (CON) at the University of Florida revised its graduate curriculum. The Masters Degree students were no longer required to do research and write a master's thesis. Instead, students take a three-course sequence: Theory and Research for Nursing, Research and Statistics for Nursing, and Integrating Research Literature. In the latter course (NGR 6970), students choose a clinical topic, find any integrative reviews already written on the topic, find other relevant articles showing evidence, and synthesize the knowledge into an integrative literature review. In the textbook for the course, Cooper1 describes the process of synthesizing or integrating research as having five stages: problem formulation, data collection (the literature search), data evaluation (assessing the quality of studies), analysis and interpretation, and presentation of results. It is the second and third steps where the librarian can help. The HSCL's liaison to the CON was on the college's curriculum committee when the course was designed and added her input on the benefit of having a library instruction session for the students. She was no longer on staff when the professor for NGR 6970 requested such an instructional session in 1998, so the session was developed by the coordinator of educational services.

The two hour session covered how to locate systematic reviews in the literature and how to locate controlled trials on a clinical topic if there are no systematic reviews. Systematic reviews can be found in major medical journals (Annals of Internal Medicine, JAMA, BMJ, etc.) and in specialized journals such as the ACP Journal Club, Evidence-based Nursing, and the Online Journal of Knowledge Synthesis for Nursing. A database that is important for locating systematic reviews is the Cochrane Library, an expensive database for which we did not have a subscription. On September 16, 1998, the National Library of Medicine and the Medical Library Association sponsored a teleconference "Evidence-Based Health Care in Action". In connection with the teleconference, a two-week free trial of the Cochrane Library was offered. The Library's session for NGR 6970 in Gainesville was held on September 16, so these students had access to the database for two weeks; a similar session was held in Orlando a week later, giving students one week of free access. A demonstration was done for students in each case, and they were able to try their own searches later. Following this trial period, the Health Science Center Library decided to subscribe to the Cochrane Database and Evidence Based Medical Reviews beginning in January, 1999. To locate controlled trials of therapies in a bibliographic database, one needs to use quality filtering strategies to pull up articles using terms such as placebo, double-blind, controlled trial, etc. PubMed, the Internet version of MEDLINE produced by the National Library of Medicine, has a new feature called Clinical Queries.2 Research methodology filters in Clinical Queries are based on an article by Haynes, et. al.3 Four categories of searches can be done: therapy, diagnosis, etiology, or prognosis. The emphasis can be on sensitivity (including most relevant articles but also including some less relevant ones; also called recall) or specificity (including mostly relevant articles but probably omitting a few; also called precision).

A sample search was done using the problem "are non-steroidal anti-inflammatory drugs (NSAIDS) beneficial in treating osteoarthritis of the knee in the aged?" Using keywords osteoarthritis AND knee AND aged AND NSAIDS and choosing therapy and specificity, students could find 151 articles that were double blind studies of NSAIDS compared to a placebo or to another form of treatment or to another NSAID. For a search on therapy, using sensitivity, the quality filter added the terms "random controlled trial" as a publication type, "drug therapy" as a subheading, "therapeutic use" as a subheading (not exploded), and "random*" as a truncated keyword.

Clinical Queries also maps each keyword to all fields including MeSH terms, which are controlled vocabulary that are assigned by the indexer for each article that goes into the MEDLINE database. It also automatically "explodes" any MeSH terms, meaning that it finds the articles using the broad term such as Anti-inflammatory Agents, Non-steroidal and also the more specific terms for the individual drugs, such as Ibuprofin and Naproxin. These articles were compared with those on the same topic using the specificity emphasis. There were 246 using sensitivity, and 151 using specificity.

Ann McKibbon, a librarian at McMaster University, and others have developed similar search strategies to use with the Cumulative Index to Nursing and Allied Health Literature (CINAHL) database (Table 1). Students in NGR 6970 had learned the basics of searching CINAHL by subject in a previous course. This time students tried out the quality-filtering techniques suggested by McKibbon4 to find the best clinical

articles on this or any other treatment topic.

Table 1: CINAHL search strategy suggested by McKibbon.

No.	Records	Request
1	8754	(CLINICAL-TRIALS or RESEARCH-METHODOLOGY or RANDOM-ASSIGNMENT or CROSSOVER-DESIGN) in DE
2	77660	(RESEARCH or CLINICAL-TRIAL) in DT
3	28292	RANDOM* or (DOUBLE near1 BLIND*) or (DOUBLE near1 DUMMY) or MASK* or SHAM or PLACEBO* or (CONTROL* near1 TRIAL*) or EFFICACY or EFFECTIVENESS
**4	92576	#1 or #2 or #3
5	564	explode "ANTIINFLAMMATORY-AGENTS,-NON-STEROIDAL"/therapeutic-use/all age subheadings
6	203	explode "OSTEOARTHRITIS"/diet-therapy, drug-therapy, radiotherapy, surgery, therapy/all age subheadings
7	1271	"KNEE"/all topical subheadings/all age subheadings
8	322	explode "KNEE-JOINT"/all topical subheadings/all age subheadings
9	1541	#7 or #8
10	6	#5 and #6 and #8
*11	5	#10 and #4

**Set 4 could be used with any student's disease/disorder topic
***CINAHL does not consistently assign age descriptors, so "aged" was not used in the search strategy.

CINAHL and MEDLINE have some overlap in coverage of nursing journals, but most of the articles picked up in this search were unique. In 1998 CINAHL started including references to the Cochrane Collection, so three of the five references found were to that collection.

DENTAL RESIDENTS

In 1989 one of the librarians in the HSCL collaborated with a dental faculty member who was head of the orthodontics residency program, a three-year post-graduate program requiring the writing of a dissertation. They worked out a series of three classes by the librarian to prepare these residents to do research for their dissertation. In 1990, the Director of Advanced and Graduate Education for the College of Dentistry (COD) asked that the dental residents from all the graduate programs be included in the non-credit course, and an additional librarian taught some of the sessions.

Over the years the print indexes originally taught were supplanted by their CD-ROM versions, and more recently by their Web-based counterparts. Content of the class includes basic search strategy, two keyword databases (Current Contents and Science Citation Index), and the library's OPAC and MEDLINE that could be searched with MeSH headings (controlled vocabulary). Also, the PDR database has factual information on drugs and ways to check on drug interactions for a list of drugs that a specific patient might be taking. Recent additions to the course content were the Stat!Ref online collection of textbooks and a section on searching for dental resources on the Internet. Several search engines and directories were demonstrated to show that concepts like Boolean operators and truncation are needed for an Internet search as well as for a regular database search.

Evaluation of the class has changed over the years. In the early years of this class a pre-test and a post-test were developed by the two librarians and were given to see what the residents knew about the library resources before the first session, and what they knew after the last session. These were based mainly on the

print resources. Later a student evaluation form was instituted for all classes and at the end of each session the students were asked to rate how well the various topics were covered on a scale of 1 to 5 and to add any additional comments (Appendix I). This has never provided very meaningful information, since it was so dependent on what the person's library skills were before class. Those with good library skills thought it was too long, too slow and too easy, but those who consider themselves "computer illiterate" thought it was too short, too fast, and too advanced. This evaluation did not provide feedback on whether the students were learning the skills covered.

In the summer of 1997 the second librarian was then the liaison to the COD. She taught all the sessions and was asked to provide grades for the residents. This necessitated determining how well they could put into practice the concepts discussed in the sessions. An assignment was developed covering basic search strategy and how to formulate a set of search terms to use in a keyword-indexed database such as Current Contents or Science Citation Index. The second assignment included the same student-chosen topic and instead of keywords, MeSH headings were to be used to represent each of the concepts in the search. The last assignment was to do a more complex search using three concepts, limiting by English and a publication type on a different topic in MEDLINE. For each assignment students did a search in the required database. They turned in the search terms on the search strategy sheet, a printout of at least two citations on the topic with the keywords or the MeSH headings included in the citation, and a copy of the search strategy used. These three assignments plus class attendance were the basis of the pass/fail grades assigned by the librarian.

Because this group meets with the librarian for four class sessions, each a week apart, some classroom assessment techniques could be implemented. Classroom assessment has been defined by Patricia Cross5 as "small-scale assessments conducted continuously in college classrooms by discipline-based teachers to determine what students are learning in that class" (italics in original). For librarians, we would substitute "library classrooms" for "college classrooms", and "librarians" for "discipline-based teachers". The idea is to see whether students are learning what the librarian thinks she is teaching. In their book Angelo and Cross6 have some classroom assessment techniques that can be adapted by librarians. One, the "fuzziest point", gives each student an opportunity to turn in anonymously the topic that was the least clear from the day's lecture. The librarian did this with the dental residents and tallied results after class to see what needed to be clarified at the next class meeting. In 1998, the "fuzziest point" from the second session was MeSH headings, a topic that was introduced and then expanded upon in the third session. This technique gives the librarian a chance to clarify a concept that is essential to students' understanding of the rest of the course. Students don't always ask the questions to let you know they do not understand. Another classroom assessment technique was a chart with labels across the top for three of the databases discussed during the four sessions (Appendix II). Along the side were labels for such items as how far back the database could be searched, whether it included journal articles only or proceedings and other publication types, whether it was keyword only or if there was controlled vocabulary. The cells in the chart were empty. One year it was used as individual seat work, with each student turning one in. Another year it was used as a group exercise with the chart on an overhead transparency that was filled in by the librarian in response to the group's answers to the questions. Both times, the librarian had prepared a completed chart to distribute to the students after the assignment was done in class.

DISTANCE EDUCATION AND LIFELONG LEARNING

Another need for the students in any of the HSC's six colleges is how to continue to search the literature when they are no longer students at the University of Florida. The HSCL and University of Florida database licenses are written to include only faculty, staff and students, so when the students graduate, they no longer have access to these familiar resources. Some of the databases are available via the Internet and there are others that students may not have used before. Unfortunately this means learning another version of the same database or learning an entirely new database.

Two versions of MEDLINE are available to the general public at no charge and anywhere on the globe.

PubMed is MEDLINE only, but includes the most recent articles even before they are indexed. Internet Grateful Med includes not only MEDLINE, but 14 other databases including BIOETHICSLINE, CANCERLIT, three AIDS databases and HealthSTAR. The above databases all use Loansome Doc, a document delivery option, so that former students can identify our library or another health science library to provide the documents for a set fee. The database citations from a literature search are sent in electronic form to the contracted library and the articles can then be mailed or faxed to the requester. Nursing students and those in the College of Health Professions are accustomed to using the CINAHL database. CINAHLdirect is offered on an individual subscription basis to individuals at a fairly modest price. Thus fourth year dental students, second year nursing students, and graduate students in Orlando had sessions on accessing databases remotely.

INFORMATION NEEDS OF BIOMEDICAL RESEARCH STUDENTS

Basic science students in academic health centers engage in research on topics such as the genetic basis of disease, the molecular aspects of neural transmission, and the development of molecular diagnostic tests. MEDLINE, the database traditionally taught to clinical students, is also a critical database used to locate biomedical research literature. However, traditional search strategies focusing on the use of MeSH terms, may not be optimal for students performing research on very specific topics, such as individual genes or proteins. While teaching MEDLINE to incoming clinical students likely concentrates on the use of MeSH terms, research students must also be well versed in using keyword searches, taking advantage of synonyms and forms of names (BRCA2, BRCA-2, BRCA 2). Multiple search strategy comparisons and practice searches provided during instructional sessions are useful tools in teaching these concepts.

Although journal articles are the main mode of formal communication in the sciences, basic science students make great use of the book literature.7 Students often use basic and advanced textbooks in their primary subject areas. Research students require information on laboratory techniques and protocols, and the journal literature alone will not meet these needs. Students need to learn the importance of monographs and monographic series, and how to locate them in the library. Unlike clinical students, research students often need older literature, whether in journal or book form. Dissertation literature reviews require exhaustive searches of old and historical works. Therefore, students need experience using pre-electronic print indexes. The use of the most primary literature - dissertations and theses - must also be emphasized.

Basic science research is often interdisciplinary, and as such, requires the use of many databases, alternative search terms, and literature outside the narrow specialty of the student.8 Training in databases other than MEDLINE is essential. Students should be encouraged to search multiple databases, including Biological Abstracts, GenRef, Current Contents Connect, and Dissertation Abstracts. Web of Science, the web version of Science Citation Index, may be especially useful, as its "cited reference" search and "related records" feature can help dissolve subject boundaries. Introductory- or mid-level books are important in meeting interdisciplinary needs, as students need to be "brought up to speed" in areas that might be peripheral to their major area of study. Broad "summary" books are also useful for interdisciplinary researchers.9

Finally, the influx of new molecular information necessitates the use of fact-based databases such as GenBank, as well as search tools like the Basic Local Alignment Search Tool (BLAST). Graduate students are beginning to expect that molecular structure viewers and other non-traditional software and databases be available through the library. More and more medical librarians are being expected to meet these information needs through instruction. Genetics and molecular biology are just the most recent challenges to confront the biomedical librarian.

LIBRARY INSTRUCTION FOR BIOMEDICAL RESEARCH STUDENTS

Health science center libraries well versed in meeting the needs of their clinical students may be less prepared to meet the information needs of its basic science research students. In a recent survey of academic health center libraries which consider both M.D. and biomedically-related Ph.D./M.S. students part of their

primary clientele, over 50% of respondents indicated that their library either lacks or offers reduced bibliographic instruction, course-integrated instruction or library orientations targeted for their Ph.D./M.S students (Appendix III).10 Several factors may be responsible for this situation. Library school classes dealing with health science librarianship often focus on clinical librarianship to the exclusion of research. Most continuing education classes for medical librarians, again, tend to concentrate on clinical information, although this is starting to change. New fields of research study, including molecular genetics and genomics make it difficult for researchers, let alone librarians, to keep up. Given many medical librarians' clinical focus and the sheer numbers of clinical versus research students, it is not surprising that the specialized information needs of biomedical research students may not be as fully considered by traditional academic medical libraries. Respondents to the AAHSLD listserv survey indicated that research students are the population that is the hardest for medical librarians to reach. Many research students and faculty seem to think that they already know all they need to know about libraries and information; attendance by students at research-targeted instructional sessions tends to be quite low.

COLLEGE OF MEDICINE PH.D. STUDENTS: INTERDISCIPLINARY RESEARCH AND MOLECULAR SEQUENCE DATA

Although the HSCL has a long tradition of bibliographic and course-integrated instruction for its clinical programs in Nursing, Dentistry, Medicine, Veterinary Medicine, Health Professions and Pharmacy, until 1996 the library had never offered instruction targeted at the research students. In collaboration with the College of Medicine (COM), the HSCL has developed a unique three- part information skills instructional program for biomedically-related Ph.D. students, taking into account their specific information needs. In January of 1996, the HSCL's coordinator of educational services and a librarian interested in research students (later to become the COM/COVM basic sciences library liaison) met with a subcommittee of the COM's curriculum committee to discuss a library skills component for new student orientation. The COM had just revised the curriculum for incoming Ph.D. students by developing a new Interdisciplinary Program in Biomedical Sciences (IDP). All incoming Ph.D. students were committed to a common curriculum for their first year, consisting of classroom study and practical laboratory training. During the first week of their graduate program, students are introduced to a series of basic skills, including laboratory protocols, radiation safety, and information retrieval. During the first year, students rotate through a variety of faculty laboratories to help them focus on a particular area of interest. Following the first year, students choose a research area from among one of six advanced programs (Biochemistry and Molecular Biology; Genetics; Immunology and Microbiology; Molecular Cell Biology; Neuroscience; and Physiology and Pharmacology) and then specialize in that area.11 The resultant degree is the Ph.D.
The HSCL agreed to participate in the IDP program and provide instruction for these students. Through a series of negotiations with the COM faculty, a program of library orientation/instruction sessions (described below; see Table 2 for overview) were developed, taking into account the particular information needs of these research students. All sessions currently take place during the students' first year, and are taught in the HSCL Computer Classroom. Enrollment in IDP has increased each year, from 23 students in 1996, to 28 students in 1997 and 44 students in 1998. Multiple handouts and "cheat sheets" are provided at each session.

Table 2. Overview of Library/Database Sessions for Incoming IDP Students at the University of Florida Health Science Center Library

- Session I: Basic Library Orientation, 1hr, Week 1
  - Introduction to HSCL library liaison program
  - Library services
  - Library web page, including e-journals and SearchNet
  - Title/Author Searching in OPAC

    - List of print molecular resources (textbooks, protocol resources, etc.)
    - HSC dissertations
    - Library tour
- Session II: Introduction to Database Searching; 2 1/2hrs, Week 8
    - Building search strategies (MeSH and keyword)
    - Print and electronic thesauri
    - Extensive MEDLINE searching
    - OPAC subject searching
    - Introduction to a variety of databases including:
        - BIOSIS: GenRef
        - Biological Abstracts on CD
        - Current Contents Connect
        - Web of Science
        - Dissertation Abstracts
- Session III: WWW Genetic Resources; 2hrs, 2nd Semester, Week 14
    - NCBI Web Page
    - Nucleotide and protein sequence searching through Entrez
    - BLAST (Basic Local Alignment Search Tool)
    - OMIM (Online Mendelian Inheritance in Man)
- Other Web Resources (changes each semester)

Session I is a one-hour, general orientation to the library, its services, and resources. Students are introduced to the library's liaison program and the COM basic sciences library liaison, who developed and teaches these sessions. Students are led through the library's web page, including its electronic journals, web search tool (SearchNet), and the NOTIS-based OPAC. Students learn to use the OPAC to find journals by title, and books by title or author. The interdisciplinary nature of their future research is emphasized, and students learn that the materials they need may be located at various libraries on the University of Florida campus, primarily the HSCL, the Marston Science Library, and the Veterinary Medicine Reading Room. Students are introduced to a variety of print resources in molecular biology: textbooks, introductory materials and a multitude of protocol resources. At this time, students are also reminded of the importance of older materials, essential to find exhaustive and historical information on their particular dissertation topic. This directly contrasts with clinical orientation sessions, where students are encouraged to use the most recent materials. Students are also introduced to the HSCL's collection of HSC dissertations, retrievable by author, title, MeSH, college, department and major advisor. The session ends with a tour of the library. Following session I, it is expected that the students understand the services that are offered by the library, how to find known materials in the library, and where to go for further assistance (service desks and library liaison).

Session II covers bibliographic databases through 2 and 1/2 hours of demonstration, lecture, and hands-on searching. Building effective search strategies is emphasized, with MEDLINE being the primary database explored. Students learn the basics of searching through both print and online thesauri for complex information by searching for papers on "the physiology of ion channels in mitochondria". Although MeSH terms are essential for performing exhaustive/precise searches in MEDLINE, MeSH terms do not exist for many of the very specific search topics these students need. Unlike our clinical classes, this session also emphasizes the importance of keyword searching in MEDLINE. A variety of searches are given to the students as "practice homework"; suggested search strategies are sent to the students two weeks later as follow-up.

Once the students have been introduced to subject headings, keyword searches, and building search strategies, they are exposed superficially to a variety of other databases including GenRef, Biological Abstracts on CD, Current Contents Connect, Web of Science and Dissertation Abstracts. The interdisciplinary nature of basic sciences is emphasized and students are encouraged to search multiple

databases. Each of the databases is introduced with a multipage syllabus including a series of examples, as well as a onepage "cheat sheet" that gives basic information on the database and its search fields/strategies. A comparison grid of database attributes (customized from Appendix II) emphasizing database similarities and differences is filled in by the students as a group exercise. Students are encouraged to attend subsequent in-depth database classes which are offered throughout the year, and are given a schedule for the Fall semester. Follow-up e-mail reminders facilitate students' registration for these classes. The most innovative of the sessions is Session III, which has been developed to introduce students to molecular information on the World Wide Web. These research students, whether they will become geneticists, molecular biologists, microbiologists, or biochemists, are likely to use these resources extensively. Many pharmacology, neuroscience and physiology students will probably use these databases at some point in their careers, although perhaps to a more limited extent. Graduate students often learn to use these databases on the job, at the knee of senior graduate students or post-doctoral researchers. There are currently no for-credit courses at the HSC to introduce students to these resources. It has become the responsibility of the basic science liaison librarian to provide the first (and perhaps only) formal classroom instruction in the use of these databases and search tools.

The session starts with the National Center for Biotechnology Information (NCBI) web page.12 Searches in both the nucleotide and protein databases via Entrez are demonstrated and then completed by the students. Students use the Basic Local Alignment Search Tool (BLAST) to search for sequences similar to a known sequence of interest. Students retrieve information on a particular genetic disorder in Online Mendelian Inheritance in Man (OMIM), a catalog of human genes and genetic disorders. Finally, students take a tour of the web, visiting a variety of other research sites.

At the end of each of the three sessions, students are asked to complete class evaluations to determine how well concepts are understood and provide additional feedback about the class (customized from Appendix I). As noted above in the section on Dental Residents, the 1-5 scales are not always effective in determining the level of student learning. However, the feedback provided by students in response to the open-ended questions (Most difficult concept?; Most useful concept?; Any other comments?) has been useful. Follow-up e-mails are sent by the librarian to the whole class to elaborate on any points that were considered by the students to be difficult or unclear. Aside from the positive evaluations given by students, evidence of the utility of the sessions is provided by the extensive subsequent e-mail reference questions directed to the liaison librarian, invitations for follow-up consultations, and students' attendance at in-depth database classes. The evaluations (even 1-5 scales) can also be powerful evidence to convince faculty of the utility of the program, as well as need for change, as described below.

Although the first year of library instruction was successful, much fine tuning and adjustment has occurred to improve the program. In 1996, all three sessions were held the very first week of school, during the students' orientation to graduate school. Although the librarian was concerned that the students could be overwhelmed by information during orientation week, it was the only time allocated by the COM. Student evaluations indicated that this timing was not optimal, as students were exhausted by general graduate school orientation, did not need this level of instruction so early in the semester, and forgot what they learned before they actually had the need to use it. Finally, the genetics databases came far too early in their curriculum, as most of the students had not learned enough molecular biology/genetics to use the databases effectively. Based on the students' evaluations and librarian's recommendation the 1997 sessions were delayed. Sessions I (library orientation) and II (search strategy/databases) were held in October, while session III (genetics resources on the web) was moved to the following April. Students preferred this arrangement, as sessions II and III were offered when the students needed the information, and/or when they were more able to understand the complex biological topics. However, students indicated that they did not want to wait until October to have their first formal introduction to the library and library tour. Therefore, in the Fall of 1998, we developed the most effective sequence for the program: session I the first week of school, session II in October, and session III in the following April. While this program is not truly course-integrated as defined by Allegri13 (no graded assignments; attendance not required), the sessions are now most definitely tied to the students' time of information need, and as such, have proven to be quite effective

according to students, faculty and librarian.

VETERINARY MEDICINE RESEARCH STUDENTS: WORKING OUTSIDE THE CURRICULUM

Our experience with the COM IDP students has convinced us that a three part instructional program can be quite useful in introducing graduate students to the information tools they need. The HSC's College of Veterinary Medicine (COVM) also graduates Ph.Ds. Like their counterparts in the COM, these students study a multitude of research problems, covering fields from gene therapy to pathogenesis of disease. These students have nearly identical information needs as their COM colleagues (some COVM students may be more interested in animal topics). It is likely that a similar bibliographic instruction program will be effective for these students as well.

In the spring of 1999, we expect to offer our three-session series to the COVM Ph.D. students. Although the HSCL has been involved in library/database orientation for incoming veterinary students and additional MEDLINE and CAB orientations for a second year COVM epidemiology class since the late 1970s, the HSCL has never offered course-integrated or faculty-sanctioned classes for the Ph.D. students. Approximately 60 Ph.D. students are currently enrolled at various stages of their degree program, and the college accepts approximately 12 students per year.

Using the three years of successful classes for the COM IDP students as evidence, the COVM basic science library liaison has approached the COVM administration to try to arrange time in the curriculum for a similar program for veterinary graduate students. Initiating the program for the COM was relatively straightforward, as the COM Curriculum Committee subcommittee had approached the library, and in the name of curriculum revision, the faculty have adjusted their curriculum to make room for library instruction. At this time, the COVM is not undergoing a revision of its curriculum. Although the COVM administration supports library/information instruction, it will be difficult to convince faculty to relinquish 6 hours of classroom time. A new strategy has been considered. Working with the president of the COVM Graduate Student Association (GSA), the liaison plans to offer the information sessions in the evening or weekend hours. Similar non-library voluntary sessions arranged by the GSA have been successful and attended heavily, the most recent being a Saturday workshop on how to write and submit papers for publication.

It is expected that nearly the same three sessions will make up the COVM program, with the addition of CAB to session II. Examples and practice searches will become a bit more animal-centered. Since students will not be required to attend the sessions and sessions are not related to a particular course, we will need to market the classes creatively. Advertising will take advantage of the friendly rivalry that the COVM Ph.D. students have with both the veterinary students and the COM IDP students. The library will be able to use these programs as evidence for the utility of the sessions, and will encourage the COVM Ph.D. students to attend and not be "left behind!" their counterparts. If these classes arranged through the GSA are successful, they will serve as a model to reach other student populations when it is necessary to work outside the curriculum.

WHERE DO WE GO FROM HERE?

The above examples demonstrate how the HSCL is meeting the bibliographic instruction needs of dental residents and nursing MSN students and biomedically-related Ph.D. students, as well as plans for the veterinary medicine Ph.D. programs. Although the library also orients incoming clinical medical, veterinary medical, pharmacy, dental and health professions students to the library, this paper has concentrated on those programs which are the most innovative or extensive. The HSCL has relied on the literature, experiences of other libraries, and close work with faculty and students to discern the actual information needs of these particular students. The HSCL has clearly delineated between clinical and research programs, addressed unique information needs (quality filtering and molecular sequence information), used classroom assessment techniques and developed full-scale instructional series, rather than simply orientation sessions.

Where to go from here?

Each year the databases available to the nursing students in Orlando changes. For two years they have had access to CINAHL on FirstSearch, but no way to look up terms in a thesaurus or to "explode" terms. The CINAHL on WebSPIRS will be available to them soon giving them both of those capabilities. The Internet Grateful Med databases such as BIOETHICSLINE and CANCERLIT could be used to better advantage with these students since there are no charges and no licenses.

The College of Dentistry has been moving toward a competency-based curriculum to be implemented in 1999/2000 in anticipation of an accreditation site visit in 2001. Under the domain of professionalism, one of the major competencies is critical thinking and information management. The dental liaison has identified several courses where course-integrated instruction could be added. One is a new second year cariology course and the other a combined basic science/clinical dentistry problem based learning course. An objective structured clinical examination (OSCE) is being developed for students to take at the end of the second year. The liaison to the COD is planning a MEDLINE station for the OSCE, similar to one implemented with the College of Medicine in 1994.14 A required senior seminar series is also being planned and would be a better venue for the PubMed and evidence-based session than a voluntary class early in the senior year as was done this year.

Although our IDP instructional sessions are well developed and first year students find them to be useful, the HSCL currently offers nothing targeted to 2nd year and beyond COM IDP students. More experienced students could benefit from a yearly "What's new at the library" session, and it is our hope that we will be able to offer such a session in the Fall 1999 semester. Approximately 50% of the advanced students have requested the updated 1998 incoming IDP handouts, and several of these students have asked about attending sessions, so an audience seems assured.

The library might provide more course-integrated instruction to students concerning molecular databases and search tools. Several of the IDP students have asked for more advanced classes in the use of the NCBI web page, as well as the GCG computer package. A bioinformatics user needs assessment is planned for the Fall of 1999 or the Spring of 2000. Again, this instruction should be valuable for the COVM Ph.D. students as well as the COM IDPs.

The HSC's College of Pharmacy (COP) Ph.D. students are in serious need of attention at this time. The library has never offered any instruction or orientation targeted to these students. One faculty member in the Department of Pharmaceutics teaching a class in Pharmaceutical Biotechnology heard about the library's GenBank classes for IDP and undergraduate genetics students15 and has asked that the basic sciences liaison develop a similar customized session for his class. The faculty member expects to invite other COP faculty and Ph.D. students not registered in his course. We hope that this first step will start a dialog on course-integrated instruction for this particular student population.

New academic programs are constantly being added to the HSCL's primary clientele list, including health informatics, biomedical engineering and audiology. Opportunities for developing innovative, course-integrated, learner-centered instructional programs will be on the horizon for the foreseeable future.

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Appendix I

Appendix II

Appendix III

Return to Contributed Papers Session TOC