▲ Librarians and Occupational Therapy Faculty: A Collaboration for Teaching Evidence-Based Practice

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Students in allied health educational programs learn evidence-based practice (EBP) skills, yet often do not consistently utilize these skills as practitioners. Barriers to implementing EBP include time pressures and lack of skill. This descriptive study explains how librarians can teach information literacy skills and strengthen knowledge of EBP in graduate occupational therapy (OT) students. The goal of the study was to evaluate students' perception of the effectiveness of learning activities about EBP, and librarians' perception of the value of teaching in an OT curriculum. Sixty-three students at the University of Texas Health Science Center at San Antonio read articles and learned didactic information from OT faculty and librarians about EBP. Students researched intervention questions and electronically sent searches to librarians for feedback. Students applied skills by researching an intervention of their choice. Evaluative data were collected from students in 2009 and 2010 and from librarians in 2009. Both groups rated the learning experiences highly. Students felt the learning experiences improved their effectiveness in carrying out EBP. Librarians valued the experience of teaching information literacy to OT students. These results support other studies showing librarians' effectiveness in developing EBP skills in students. Recommendations are given about using journal clubs and secondary literature to ensure the use of EBP at the workplace. J Allied Health 2012; 41(1):e15–e20.

IMPLEMENTATION of evidence-based practice (EBP) is strong in the profession of occupational therapy (OT) compared to nursing and other allied health professions.[1] As early as 1986, OT leaders gave presentations at national conference about the importance of research to the profession's continued existence.[1] In 1999, new accreditation standards required OT educational programs to produce graduates who had research and EBP competencies.[2] An EBP forum began in the *American Journal of Occupational Therapy* to increase OTs' use of EBP in clinical practice.[3] During the last decade,

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OT professional journals referenced increased numbers of research studies, tests, and assessments, indicating the importance of evaluative and outcome measures. The profession has created several electronic databases and EBP resources to make research available. Educational opportunities abound to help older practitioners and faculty become proficient in EBP.[1]

Despite the profession's strong valuing and adoption of EBP's ideals, in reality, practitioners are not incorporating EBP in their daily practice as routinely and regularly as would be expected. Therapists' lack of understanding, technical skills, and access to literature, time constraints, and organizational factors are reasons that EBP is not used consistently.[4-8] Some practitioners are not clear about the meaning of "evidence-based practice,"[8] or have only a superficial understanding of its principles.[9] Many therapists do not know how to search databases, evaluate research, and implement findings into practice.[8] Accessing and appraising the evidence are processes that involve understanding of concepts such as "indexing," "Boolean operators," "meta-analysis," "probability," for example, which require time and motivation to learn.[7] Therapists have little time to engage in these activities, given productivity demands of current clinical settings. Finding robust research relevant to OT conditions can be difficult. Database searches often yield studies that do not pertain to the situation at hand.[10]

Holm[11] described a five level evidence hierarchy developed by Moore, McQuay, and Gray[12] and suggested its use to guide OTs' appraisal of research evidence. The levels represent the rigor of research design and procedures used in carrying out an investigation. Level I research (systematic reviews and meta-analytic studies) offers the best evidence, while Level V evidence (opinions of respected authorities, descriptive studies) offers less convincing evidence. Holm stated that Level I studies in OT are those to which professionals can attribute the most confidence about the effectiveness of OT, and those which OTs should carry out and publish. She then applied the research hierarchy to evaluate "the strength of our collective evidence as a scholarly profession" by analyzing articles in *Occupational Therapy Journal of Research* published between 1995 and 1999. Her research showed that most of these articles ranked at Level V, the lowest level of the hierarchy.[11] The profession needs a stronger research base derived from solid clinical studies to guide practice decisions.[1]

Practitioners often gain information to answer practice questions from colleagues, supervisors, and the Internet, even when EBP skills have been taught in their educational program.[13] As part of a study regarding attitudes toward EBP, Bennett et al.[4] mailed questionnaires to 1491 OTs who were members of the national professional occupational therapy association of Australia. Of this sample, 649 (44%) OTs completed the questionnaire. Even though 96% of the practitioners felt EBP was important, more therapists used clinical experience (96%), continuing education (82%), and colleagues (80%) to facilitate decision making compared to the number of therapists using research (56%).[4]

Educators and practitioners could benefit by examining methods used to teach EBP skills in educational programs. OT educational programs teach EBP in a variety of ways, including a single guest lecturer, a separate course dedicated to information literacy, course-integrated instruction throughout the curriculum applying EBP to different clinical populations, and during fieldwork.[5,7,14-18] No comparative studies have been done to judge the effectiveness of different teaching methods, so a definitive statement upholding a particular strategy as better than others is not possible. However, more recent articles on teaching EBP describe strong benefits of librarians teaching information literacy skills to students. Several examples of librarian and faculty collaboration in nursing, nutrition, occupational therapy, physical therapy, and respiratory therapy programs are reviewed here to illustrate specific roles librarians can play and methods used.

Librarians are outstandingly skilled to help develop competency in EBP. They can collaborate with faculty to integrate EBP into single courses or throughout the curriculum, teach high level skills in searching and evaluating the literature, and assist students in individual searches. Librarians can help practitioners develop EBP skills by developing online tutorials, creating resource portals, and teaching workshops.[1]

Klem and Weiss,[19] librarians from the University of Pittsburgh, discussed teaching nursing students the organization of information in databases to create effective search strategies. They explained the concepts of controlled vocabulary and subject headings. They identified advantages of searching for secondary literature, i.e., systematic reviews, to simplify EBP steps of critically appraising and summarizing the evidence.[19]

Smith and Penumetcha[20] described a faculty-librarian teaching collaboration in an undergraduate nutrition research course at Georgia State University. The faculty member presented didactic information about creating searchable clinical questions, critically analyzing research, and determining the level of evidence. The librarian covered specific techniques of accessing electronic databases, including CINAHL, PubMed and Cochrane Library, carrying out efficient searches by picking appropriate search terms, and conducted a hands-on literature searching activity. On the posttest, students felt the librarian's participation in the course was helpful in learning about EBP, and learning skills

necessary to reach their educational and career goals. The authors concluded that the teaching collaboration was successful and encouraged other allied health faculty to utilize a model like this and report their results.[20]

Van Moorsel[21] discussed a 21-hour core course, Computer Literacy for Healthcare Professionals, designed collaboratively by faculty and librarians for incoming undergraduate occupational (OT), physical (PT), and respiratory therapy (RT) students at Stony Brook University. Librarians taught students how to search the electronic databases PubMed, MEDLINE, CINAHL, and MDConsult, formulate patient/ population, intervention, comparison, and outcome (PICO) questions, evaluate research, produce professional presentations, understand data management, statistical analysis, and relational database theory, and present research topics. Pretests and posttests were administered to the intervention group of OT, PT, and RT students who took the course, and to a control group of physician assistant (PA) students who did not take the course. An additional posttest administered 5 weeks later to both groups assessed students' retention of skills. Results showed the intervention group acquired and retained core competencies at a significantly higher level than the control group. The intervention group improved in self-confidence in all core competencies and were satisfied with the course.[21] These studies provide support for a descriptive non-experimental study carried out at the University of Texas Health Science Center at San Antonio about librarians providing information literacy instruction for OT students.

Methods

The OT curriculum is an entry-level Master degree program with 35 students accepted each year. Since 2002, the OT curriculum had been infused with learning activities in EBP, yet students still had difficulty searching the databases effectively and performing EBP skills well. Informal conversations between OT faculty and librarians about the students' lack of proficiency led librarians to offer to teach several classes within selected courses. In summer 2009, a librarian participated in the curriculum committee meeting to assure appropriate integration of library instruction into the curriculum. Librarians and OT faculty collaborated on several innovative graded learning activities in four courses during the first fall, first spring, and second fall of the curriculum to improve students' skills. This article focuses on learning activities in the first fall course.

LEARNING ACTIVITIES

Students are introduced to EBP in OCCT 5010, Human Occupation across the Life Span, taught in the first fall semester. The emphasis of instruction in EBP in this course is to build a strong foundation in EBP by developing effective search strategies to locate the best evidence, and apply EBP to real life clinical situations. With the librarians' collaboration, students participated in three new sequential, graded learning experiences during a 3-week period in this semester.

TABLE 1. Learning Activities

Learning Activity 1: Foundations

- Students read 2 articles: one about EBP and its importance to OT,[11] and another one about a research study comparing 2 treatment approaches[22]
- Students identify PICO, level of research, and answer to question in article prior to class
- Students learn from OT faculty lecture on EBP and discuss 2 readings in class

Learning Activity 2: Search Strategies

- Students learn from librarians' presentation about EBP, formulating PICO, searching CINAHL and MEDLINE
- Small student groups search databases over the next week to find research articles to answer clinical questions
- Group leaders electronically submit best search strategy to librarians for review and feedback
- Librarians electronically send feedback to group leaders who share librarians' review and feedback with group members

Learning Activity 3: Application to Clinical Practice

- Students select an OT intervention observed during a previous clinical experience in a community setting
- Students formulate a clinical question in PICO format
- Students search databases, identify 2 research studies, determine level of research, answer clinical question
- Students write 1 page summary, receive feedback from OT faculty

The Learning Activities are listed in Table 1.

Learning Activity 1 consisted of students reading two articles, a 1-hour lecture by the OT faculty, and class discussion on important points in the articles. These activities provided a foundation for the next two learning activities.

Learning Activity 2 occurred 2 days later, with two librarians giving a 2-hour presentation on searching CINAHL and MEDLINE, using both lecture and interactive hands-on techniques. The librarians gave in depth information on indexing, MeSH, subject headings, and ways to combine searches. For application, five student groups of six or seven students each were assigned a PICO question to research. An example of a PICO question is:

In children with cerebral palsy, does neurodevelopmental treatment (NDT) improve postural control better than sensory integrative treatment (SI)?

Students were instructed to individually carry out a search, choose the most effective search, with each group leader sending the search string electronically to the librarians. Within a week, librarians sent feedback about the searches to the five group leaders. Feedback was shared within each student group.

Learning Activity 3 involved higher level application, giving students an opportunity to integrate concepts learned during the first two learning activities. Students selected a client and intervention observed in an earlier clinical experience, formulated a PICO question, and searched databases to find research studies that supported or refuted the effectiveness of intervention. Students wrote summaries, and submitted them to the OT faculty 3 weeks after Learning Activity 1.

Results

EVALUATION OF TEACHING APPROACH

The author created two questionnaires, one for students and one for librarians, to evaluate the teaching approach. The student questionnaire contained 12 questions about the

effectiveness of each learning activity in developing EBP skills. Data were collected from students during the 2009 and 2010 fall semesters to gather their perspectives about these educational activities. The questionnaires were given to the 10 group leaders who polled their group members for opinions. A total of 63 students, most in their mid 20s, evaluated the learning activities. No students had previous EBP training or experience other than during undergraduate or prerequisite work. Table 2 gives demographic information about students.

STUDENT EVALUATIONS

Nine of 12 questions had a "yes" or "no" answer format followed by an area for comments. The other three questions were qualitative in nature, asking students about the most valuable aspect of Learning Activity 2, how EBP skill development in the clinical observation situation was different from the two classroom learning activities, and what changes or recommendations they would make to improve student learning of EBP. Student responses to five sample questions are given in Table 3. The other four questions asked if the Holm[11] article provided foundational knowledge, if the OT faculty presentation gave an overview of EBP, if discussing the Jackson and Schkade[22] article in class clarified their ideas, and if they felt there was a continuum or consolidation of learning and skill-building in EBP over the three learning activities. Data were combined for students from both classes, as there were no significant differences between the two groups. All 63 students (100%) gave positive ratings to ques-

TABLE 2. Gender and Age Range of Students

	Gender		Age Range
	Male	Female	
2009 students (n = 31)	2	29	20–32 yrs
2010 students (n = 32)	8	24	21–48 yrs

TABLE 3. Student Responses to Sample Questions

Questions about Learning Activities	Yes	No
2. Did reading and individually answering the various questions about the Jackson & Schkade[22] article contribute to your understanding about the level of research, identifying the patients, interventions, and outcomes, formulating a clinical question, and answering the clinical question?	100 (63)	
5. Did the librarians' presentation help you improve your understanding of the steps (identifying PICO, using databases of CINAHL and MEDLINE) of doing evidence-based practice?	100 (63)	
6. Did working with your student group help you develop skills in doing a search?	95 (60)	5 (3)
7. Did sending your search to librarians and receiving feedback about your search help you develop skills in doing-evidence based practice?	97 (61)	3 (2)
9. Did the out of class assignment improve your skills in doing evidence-based practice?	98 (62)	2 (1)

*Data reported as % (n).

tions 1 to 5 and question 11 regarding the overall effectiveness of the three learning activities.

Sixty-two students (98%) felt that the out of class assignment improved EBP skills. Three students (5%) gave negative responses to question 6, asking if working with their group helped develop skills in doing a search. Two students (3%) gave negative responses to question 7, asking if sending their search to the librarians and receiving feedback helped them. One student (2%) gave a negative response to question 9, asking if the out of class assignment improved skills in doing EBP (See Table 3).

For Learning Activity 1, 100% of students stated that reading and discussing the two articles, and hearing the OT faculty presentation helped them learn skills in EBP. Student comments included:

(Holm[11] article) It really helped me understand the levels. It had good examples.

(Jackson & Schkade[22] article) It helped to formulate a PICO question from actual research before coming up with one on our own.

(OT lecture) It was very helpful to have notes to look back on and the different parts of PICO explained.

For Learning Activity 2, 100% of students stated the librarians' presentation helped them understand the steps of EBP. When asked what the most valuable aspect of Learning Activity 2 was, a student commented:

...being able to do an effective search, learning key words and steps in completing a search as it can be intimidating.

Ninety-five percent of students felt that working with their student group helped develop skills in doing a search, however 5% of students felt differently. These students commented:

I thought this was more of an individual assignment.

It wasn't much help. We each did our own thing.

It was slightly difficult going through the steps and is generally trial and error for me each time I search, so trying to coordinate that with other people was difficult.

Ninety-seven percent of students stated that sending the search to the librarians and receiving feedback helped develop skills in EBP, with comments such as:

The librarians were helpful in validating the work we did or helping to teach us a more efficient search method.

Three percent of students gave a negative response with the following comments:

The librarians did not give much feedback.

The comments were helpful but I don't think we had enough experience in EBP to implement all the suggestions ourselves.

Ninety-eight percent of students gave positive ratings to Learning Activity 3 where students independently researched the effectiveness of interventions they observed in clinical observation. Positive comments included:

We were able to put what we learned into practice, helping validate the steps in our minds.

We did not have the help or validation of the instructor or other classmates. We were forced to practice what we learned on our own.

Two percent of students did not feel the out of class assignment helped build skills because:

It was very difficult to find articles that fit our research question.

LIBRARIAN EVALUATIONS

The librarians' questionnaire, given to them after Learning Activity 2 was completed, consisted of seven questions, with five of a qualitative nature and two in a "yes" or "no" format with an area for comments. The seven questions asked how they would judge the OT students' skills at the time the students submitted their searches to them, if they thought their presentation improved students' understanding of EBP, whether they thought their feedback about students' searches helped students develop skills in EBP, what they thought was the most valuable aspect of Learning Activity 2, what they would change in Learning Activity 2 to improve learning, whether they felt there was a continuum of learning over the three learning activities, and what value the collaboration had for them and for the students. The two librarians who taught in 2009 rated the collaborative learning experience highly. They recommended giving a pretest to assess student knowledge before giving their presentation as well as

more class time to practice doing sample searches. They felt their presentation was given in a straightforward manner where students could follow the steps and gain a strong foundation. Regarding the electronic review and feedback of student searches, the librarians felt their comments helped students develop skills, improve results, and see how searches can be done in more than one way. Finally, they felt the librarian-student interaction was valuable to let students know that librarians are available as resources for help with their research. They were pleased to help with integrating library searching skills within the OT curriculum, and ways to improve their services to offer more support.

Librarian collaboration in the three other courses in the curriculum built on learning in this course and focused specifically on bibliographic management (i.e., RefWorks), and database searching for EBP interventions for school-aged children, and for clients with neurological conditions.

Discussion

The complexities of becoming an evidence-based practitioner are challenging and require concentrated efforts from students, educators, and practitioners. This study supported current literature about the value of librarians teaching information literacy. Allied health and nursing faculty should actively involve librarians to help students develop strong cognitive understanding of search strategies. Librarians' skills could be utilized well in helping academic departments provide continuing education and refresher courses to alumni and older practitioners.

Adequate time should be allotted to students' learning and practicing skills. Students in this study suggested more time, practice, and repetition would lead to greater skill and confidence in searching the literature. Students should be encouraged to utilize librarian services outside of class. Students' informal contact with librarians was related to graduates using high quality information sources, such as hospital libraries, MEDLINE, and CINAHL on the job.[12]

During the academic program when learning about EBP, students should be made aware of the realities of clinical practice and demands on their time as practitioners.[15] Students can problem-solve ways to assure that EBP will become a routine part of their future practice. Clinicians need to use efficient, effective, and time saving methods to continue EBP on the job. Faculty and students can look at different models of journal clubs and ways to initiate them in a busy clinic. Journal clubs allow practitioners to share current information efficiently. To save time on the job as practitioners, students should learn to search for and utilize secondary literature in addition to full text articles. Secondary literature consists of strong evidence that has already been appraised and summarized. Prototypes of secondary literature include systematic reviews as found in the *Cochrane Database of Systematic Reviews*, review publications such as *Evidence-Based Mental Health*, and clinical practice guidelines as found in the National Guideline Clearinghouse (http://www.guideline.gov/).[19]

Students should learn about critically appraised topics (CATs), which are condensed analyses and evaluations of research. OTCATS, or Occupational Therapy Critically Appraised Topics, a free website funded by Occupational Therapy Australia, contains many studies on clinically relevant topics of interest to occupational therapists (http://www.otcats.com/). OT Seeker, another free website developed by OTs from Australia, provides access to abstracts of research studies important for OTs to make clinical decisions (http://www.otseeker.com).

The American Occupational Therapy Association has a wealth of information on its website (http://www.aota.org), including CATS, CAPS (critically appraised papers), Evidence Brief Series, Evidence Perks, Evidence Bytes, and Evidence-Based Practice Resource Directory, all of which provide access to condensed, high-level research summaries. The website provides access to OT Search, an online database of articles archived in the Wilma L. West Library. All of these methods can make best evidence available quickly and easily at the workplace.

During fieldwork, partnerships between students and clinical supervisors could be fostered, where fieldwork students research and present EBP findings on common diagnostic conditions and interventions used in the clinic. Students can explain the strategies used to access the research and give suggestions to implement evidence. This real life practice will enhance implementing EBP in day to day clinic life, has more meaning because it has application to current clients, and is beneficial to students, OT practitioners, and clients.

Practitioners who have developed strong skills and confidence in using EBP will be more likely to continue using it at their workplace. Librarians and evidence summaries facilitate this practice.

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