Problem-based learning in a health sciences librarianship course*

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Problem-based learning (PBL) has been adopted by many medical schools in North America. Because problem solving, information seeking, and lifelong learning skills are central to the PBL curriculum, health sciences librarians have been actively involved in the PBL process at these medical schools. The introduction of PBL in a library and information science curriculum may be appropriate to consider at this time. PBL techniques have been incorporated into a health sciences librarianship course at the School of Library and Information Science (LIS) at the University of Wisconsin–Milwaukee to explore the use of this method in an advanced Library and Information Science course. After completion of the course, the use of PBL has been evaluated by the students and the instructor. The modified PBL course design is presented and the perceptions of the students and the instructor are discussed.

INTRODUCTION

The Medical Library Association's *Platform for Change* describes the challenge of library professionals working in health sciences environments as "pivotal in the handling of biomedical information, combining the ability to use the knowledge bases of medicine and the technical expertise of librarianship with clearheaded problem solving, analytical competence, and well-honed interpersonal and organizational skills" [1]. In addition, the document emphasizes the need for health sciences librarians to develop lifelong learning skills and for health sciences librarians to assume greater responsibility for increasing professional performance, often through several learning strategies. A problem-based learning (PBL) course provides students with a risk-free environment in which to practice the skills and acquire the knowledge they would need as future health sciences librarians. Problem-based learning is an instructional method characterized by the use of problems as a context for students to learn problem-solving skills and acquire knowledge

about underlying concepts [2]. PBL differs from other problem-centered methods such as case studies in that the problems are presented before students have covered much of the supporting content (in medicine this would include basic science or clinical concepts).

Changes related to the education of health sciences information professionals suggested by the *Platform for Change* and other documents developed by various library and information science (LIS) professional organizations prompted an examination and testing of the use of a modified PBL methodology in an advanced LIS course.

Literature review

Problem-based learning in the health sciences education arena was first established in North America at McMaster University in 1969 [3]. Ten years later the University of New Mexico adopted a medical PBL curriculum [4]. Several medical schools soon followed with full or partial PBL curricula, including Mercer University, Harvard University, Bowman Gray, and the University of Hawaii [5]. PBL's roots go back in history as far back as Plato and the Socratic pedagogy [6]. A growing number of medical schools adopted PBL in response to criticism of the conventional medical curriculum. Revisions were recommended to make medical education more responsive to changes in health care; to prepare students to learn throughout their professional careers; and to provide for active, independent, and self-directed learning [7].

"Information seeking skills are central to the PBL curriculum" [8]. Because of this, health sciences librarians have been involved in the PBL process from the beginning. Over the years, numerous scholarly articles have been written about this involvement. McMaster University's library has been specifically designed to serve a PBL curriculum, and as a result the library has become the key information resource to students. In fact, "students identify the professional [library] staff as among the most supportive people they encountered in the course of the degree program" [9]. The librarians at the Library of Medicine at the University of Nebraska function as facilitators in the PBL program along with other faculty, including physicians, social workers, and scientists. In the facilitator role, librarians are responsible for guiding small group discussion, including keeping discussions on target, balancing student contributions, and evaluating the students [10]. According to Schilling et al., PBL has provided librarians with opportunities to develop programs to teach information-gathering skills that support and integrate into PBL [11]. Since the implementation of PBL at the University of Pittsburgh School of Medicine, the library has provided a large-scale, intensive program integrating information seeking skills and activities into the curriculum.

The literature on evaluation of PBL curricula in medical schools has been consistent in reporting positive student reaction to PBL [12–14]. The general perception has been that traditional students perform better on a standardized examination of basic science tests (e.g., NBME Part I scores) while PBL students perform better on clinical examinations (e.g., NBME Part II). However, the generalizability of the finding has been questioned [15] and overall, review of the literature has found that PBL student performance is comparable to that of traditional students on a number of outcome variables. Other consistent findings include the high costs of implementing a PBL curriculum and the need for further evaluative research on PBL.

With health sciences librarians' long involvement in PBL, the introduction of PBL in a library and information science curriculum would be appropriate to consider at this time. Although PBL was first used in medicine, Bligh stated that it "can now be found in many teaching settings including architecture, nursing, engineering, and social work" [16] and a form of PBL has long been the norm in legal education. Detlefson suggested a reformed LIS curriculum to support new and changing roles for health sciences librarians that have been created by the changes in medical education [17]. This suggestion was reiterated by Rapple, who stated that the time has come to develop a new model of librarian education to meet the challenges raised by the growing "pedagogical needs of the electronic library" [18].

In a paper presented at the First British-Nordic LIS Conference, Olander described using PBL in LIS education at Lund University in Sweden [19]. The design of the LIS master's degree program at Lund, including the syllabus and examinations, were developed using PBL principles. This was the only application of PBL in LIS education found in the literature. Olander said that PBL highlights the problem-solving process and its central elements such as information-seeking, analysis, critical assessment, structuring, and creativity. She stated "this fosters confidence in the students [and] they learn to manage both complex and challenging issues in librarianship and are well equipped to actively promote library development and professional information service" [20]. Detlefsen stated that if educators of health information professionals can adapt their programs and skills to meet the needs of the changing health care workplace, the role that [librarians] can play in information management would be significant [21]. Olander concluded that "applying PBL in LIS education means educating professional librarians and information specialists with strong feelings for high quality user service, who are dynamic information managers, confident, and unafraid to explore new paths" [22].

Course design

The health sciences librarianship course at the School of Library and Information Science (SLIS) at the University of Wisconsin–Milwaukee has been modified to include the use of PBL techniques to explore the efficacy of this method in an advanced LIS course. The course, as described in the SLIS student handbook and as currently approved by the university, is a "survey of the basic sources used to locate information in the fields of medicine, nursing, allied health, and health care administration, along with an introduction to the traditional and innovative services offered by health science libraries" [23]. Basic courses in general reference sources and services and collection development are prerequisites for the course.

The course content addressing reference sources was not changed. Of the fourteen scheduled class sessions, the first six were devoted to coverage of health sciences reference tools, including print sources, MeSH use, and MEDLINE searching. The rest of the sessions were devoted to six problems, presented every other week to two working groups of students. The PBL problems were designed to cover a variety of broad "issue" topics relevant to health sciences librarianship, including consumer health information, accreditation, external funding, institutional re-organization, and writing for publication.

PBL was selected as a means for explicitly integrating the acquisition of problem solving skills with health sciences content. While it could be argued that educating students in the processes of reference work has always focused on problem solving, the use of PBL expanded on this in that it provided a broader scope for the problem solving exercises. It presented students with more complex problems that were integrated into a more realistic information seeking environment. Part of one session was spent discussing the PBL format and clarifying any questions related to student and instructor responsibilities in a PBL environment. The course instructor, Dimitroff, was to serve as what is generally referred to as the facilitator. However, because of some PBL modifications discussed below, the role of facilitator was changed and in fact a more traditional instructor role was assumed.

The instructor's plan was to contact practicing health sciences librarians prior to the beginning of the course to solicit problems. A message was posted to the MEDLIB-L e-mail discussion list asking for "real life" scenarios that could be adapted to the PBL format. In addition, a message was posted to the Southeastern Wisconsin Health Sciences Librarians e-mail discussion list asking for volunteers to consult with students as they worked through various problems and to act as content experts or external consultants. These messages resulted in very few responses. In retrospect, a personal request, either on the phone or in person, would probably have been much more productive. Any questions about the commitment required of the librarians could have been immediately clarified. Participation would undoubtedly have been greater and the students would have had a richer pool of contacts with which to consult. However, several students had work or internship contacts with local hospital librarians. Students regularly discussed course problems with librarians at their work or internship sites and brought insights acquired from these discussions to their group work. These librarians discussed the problems with their student interns regularly and added much to the students' experience. This highlighted the benefit of having a variety of outside experts available for student consultation. As it was, a fair amount of "expert consultation" was done with the course instructor with the result that the course instructor provided more assistance than one person typically does in PBL.

Two student groups were formed whose membership changed with each problem. For each of the PBL problems, it was anticipated that students would identify and define the problem based on the ill-structured scenario provided, identify the information they needed to address the problem, acquire the needed knowledge, synthesize it, and apply it in the development of a solution or final statement.

An example of a course problem was one that dealt with consumer health information. The students were presented with a request for information for a patient who had been diagnosed with an inoperable brain tumor. Students addressed two major areas in working through this problem, information resources and information policy. The information resources area consisted of students' identifying information appropriate for patients and evaluating it. The information policy area included defining what information services were or should be made available to health care consumers, exploring ethical issues of providing medical information to the lay public, and working with health care professionals on coordinated patient education programs. Students were asked to prepare a policy statement and justification for providing consumer health information as well as to describe how they would help the patron.

Another sample PBL problem concerned external funding. The scenario requested that a fundable idea be described, an appropriate funding source be identified, and a proposal be prepared. A grant proposal was the product of this problem solving exercise. A third problem was to prepare an article for publication in the library literature. This paper was the product of that assignment, which also included examining published research and non-research reports; selecting an appropriate journal; conducting a literature review; and writing and editing for appropriate format, style, and content.

After each problem scenario was distributed, students were directed to work as a group through the following standard PBL steps:

1. recognition of a problem with significant academic or operational implications or both (something that could be assumed given the modified PBL format used in this course),
2. initial formulation of the problem,
3. description of the problem situation,
4. identification of solutions for analysis and testing,
5. evaluation of solutions to the problem. (Birch, 1986)

Students used a variety of sources for their information gathering activities, including the literature, the course instructor, and personal contacts among practicing health sciences librarians. They set their own meeting schedules, with formal class sessions scheduled every two weeks.

Group reports were the basis for full-class discussion. Discussion of each group's problem solving process was as important and as relevant to the discussion as the products themselves—these "products" represented each problem's solution. Documents or formal presentations were to be prepared to support the group's conclusions.

Evaluation of student learning was based primarily on group reports. Group participation was monitored informally through student feedback and participation in presentation or discussion sessions. A brief questionnaire was used to obtain the opinions and perceptions of two groups of health sciences librarianship students: those involved in this modified PBL course and those who had taken the course the previous year in its traditional format (Appendix A).

Student perceptions

Students' thoughts about PBL in the health sciences course were obtained through informal class evaluations. The majority of the class felt that the stated objectives of the class were met. Most stated that the various problems were interesting and representative of real life scenarios that a health sciences librarian might face. Others commented that they felt that their critical thinking skills had been developed through the PBL format and that the relaxed learning atmosphere led to enriched interaction among individuals in the class.

Students also had negative comments about the PBL experience. Many felt that too much class time and group discussion was spent on insignificant aspects of the problems. Group discussions at times focused on details not particularly important in solving the problem; for example, a lengthy discussion of the pros and cons of charging for photocopies while working on the consumer health problem. Some students felt these kinds of discussions were more typical of a small group format rather than a PBL format. Related to the problems themselves, students expressed some diffi-

culty in distinguishing between important and unimportant aspects of a given problem.

Delegation of work was, at times, problematic. Students reported being unsure of how much work to take on or what role to take within the group. They did not know whether any individual should have assumed a leadership role within the organization of each group. Also, students were unsure how to ensure that all group members contributed to the PBL process. Some of these process problems might have been avoided by closer or more frequent contact with the course instructor, particularly during investigation of the first few problems.

Another problem identified by the students was that working through the problems took too much time relative to the length of the course. Ten weeks were allotted to working through five problems. The two weeks allocated to each problem left some students feeling that not enough content was covered. The feeling existed that more content would have been covered in a traditional classroom format.

The most frequently cited student concern related to logistics. The members of the class lived in an area that stretched from Chicago, Illinois, to Oshkosh, Wisconsin. This drastically limited the times available for face to face meetings of the groups. Electronic communication was anticipated to be able to negate this problem, but in reality it did not. The students found that many aspects of the problem-solving process were most efficiently and most effectively accomplished face to face. With group meetings occurring at most once a week, these sessions tended to be organizational. Discussion of findings was almost entirely done during brief pre-class meeting sessions and during in-class discussions. In many cases, LIS students were not resident students and were not full-time students. Meeting more frequently than once per week proved to be a problem given the many conflicting priorities of the typical LIS student.

Instructor perceptions

From the instructor's perspective, one major problem area was monitoring student learning. With formal class meetings occurring every other week, not enough feedback was provided to judge accurately whether the group work was progressing as planned. While some group formations were very open about sharing with the instructor what was going on week to week, the work of other groups was not discussed until the next formal session. A formal means of evaluating student learning, perhaps through a more rigorous presentation exercise than was used or through an examination, would allay some of the concerns regarding evaluation. At a minimum, a more explicit explanation of the weight given to the PBL process itself should

have been communicated to the students by the instructor.

The instructor's introduction to the PBL approach was relatively unstructured. During the first weeks of the PBL portion of the course, students were given a problem that included reading about PBL in medical education. All students apparently accepted the PBL approach given the description provided to them at the beginning of the semester. However, once the PBL activities were underway, there appeared to be less enthusiastic acceptance of the technique. The burden for learning was definitely on the students and this might have made those student who learn best through more traditional, more directed techniques uncomfortable. Also, because the instructor did not have any previous experience with PBL, the explanation might have been less informative in terms of the details than if the instructor been more directly involved with PBL prior to this course.

Also problematic was the lack of access to practicing librarians. The variety of viewpoints that multiple consultants could have provided would have been extremely valuable. Several class members fortuitously had their own contacts. In the future, more effort must be made to recruit volunteers to act as outside consultants and it would be the burden of the instructor to ensure that this kind of resource would be made available to the students.

Although not a major concern, something that might make use of PBL more successful in the future would be a closer, clearer tie to real life. All but one of the problems was clearly hypothetical. In addition, there was no test or examination to measure learning. Students might have found working on the problems more interesting if they were not all so clearly exercises. The one problem that was truly a "real life" problem (writing for publication) elicited the most enthusiasm. In the future, providing real life problems would be beneficial. This would also help in soliciting practicing librarians to work with students. For instance, a collection evaluation problem could be planned that would take place in a hospital library. The hospital librarian could present a problem (an evaluation of the nursing collection, for instance) and the students would carry it out. The result of their work would be used by the librarian. The payback for the librarian would be having an evaluation done of the collection while the benefit to the instructor and students would be the additional motivation provided by a real life scenario.

The final concern of the instructor echoes one of the students' concerns: content covered. Several topics could not logically be included in any of the five PBL problems. This resulted in several ad hoc lectures or unconnected discussions. While this was not an ideal situation, it was the only way to include some material that did not come up in the problem work. Even so, some topics were not covered or were only mentioned in a superficial way. In looking at the previous year's student survey and comparing student reports with the PBL students' opinions, the students in the traditional health sciences librarianship course were much more confident of their understanding of a number of health sciences topics. (Data could not be compared statistically given the small numbers of students.) This was true in all areas except two. One area where the PBL students felt more confident was, not surprisingly, searching and using the LIS literature for information on problems or issues related to health sciences librarianship. The other topic with which the PBL students felt more confident was an awareness of the hierarchical system of health sciences librarians in the United States.

Students in both the PBL and the traditional course almost unanimously agreed that they had acquired a general understanding of standard health sciences reference tools, including *Index Medicus*, other indexes and abstracts, biographical directories, drug information sources, handbooks and manuals, and medical terminology sources. This, too, was not surprising given that in the PBL course this content was covered in a traditional format. Because no examination was used to assess knowledge in any of the content areas, comparison of performance could not be done (such as the use of National Board of Medical Examination scores for medical students). Evaluation would have been subjective on all but the source related material so testing would have provided little additional insight.

CONCLUSIONS

This experiment in using PBL in a health sciences librarianship course provided both students and instructor with some valuable insights. While the flexibility of the PBL format was welcomed by all, the practicalities of its execution proved to be problematic. In some areas so much so that a traditional, or an even more modified PBL format than used here, should be considered. LIS students are very different demographically than medical students, resulting in some understandable problems with scheduling, meeting, and committing to the new format.

Using PBL for a single course resulted in the course facilitator having to abandon this role to assume a more traditional role of course instructor. This may not have had to happen if more creative means of recruiting practicing librarians to work with students had been employed. And while this problem may have been initially due to the dearth of external consultants available to the students, it may also have been a result of this PBL course taking place amidst other, traditionally conducted LIS courses. Students found it difficult to abandon pedagogical methods familiar to

them throughout years of education for a one-semester, one-course experience with PBL.

Overall, however, the experience was quite valuable. Through lessons learned, a second attempt at using PBL in an LIS course would undoubtedly be more successful.

REFERENCES

1. MEDICAL LIBRARY ASSOCIATION. Platform for Change. Chicago: The Association, 1992.
2. ALBANESE MA, MITCHELL S. Problem-based learning: a review of literature on its outcomes and implementation issues. Acad Med 1993 Jan;68(1):52–81.
3. BLAKE J. Library resources for problem-based learning: the program perspective. Comput Methods Programs Biomed 1994 Sep;44:167–73.
4. DONNER RS, BICKLEY H. Problem-based learning in American medical education: an overview. Bull Med Libr Assoc 1993 Jul;81(3):294–98.
5. IBID., 295.
6. RANKIN JA. Problem-based medical education: effect on library use. Bull Med Lib Assoc 1992 Jan;80(1):36–43.
7. IBID., 36.
8. IBID.
9. BLAKE, op. cit., 167, 171–72.
10. SATTERTHWAITE RK, HELMS ME, NOURAVARSANI R, VAN ANTWERP M, WOELFL NN. Library faculty role in problem-based learning: facilitating small groups. Bull Med Libr Assoc 1995 Oct;83(4):465–68.
11. SCHILLING K, GINN DS, MICKELSON P, ROTH LH. Integration of information-seeking skills and activities into a problem-based curriculum. Bull Med Libr Assoc 1995 Apr; 83(2):176–83.
12. ALBANESE, MITCHELL, op. cit.
13. BERKSON L. Problem-based learning: have the expectations been met? Acad Med 1993 Oct;68(10 Suppl):S79–88.
14. VERNON DTA, BLAKE RL. Does problem-based learning work? A meta-analysis of evaluative research. Acad Med 1993 Jul;68(7):550–63.
15. IBID., 556.
16. BLIGH J. Problem-based learning in medicine: an introduction. Postgrad Med J 1995 Jun;71:323–26.
17. DETLEFSEN EG. Library and information science education for the new medical environment and the age of integrated information. Lib Trends 1993 Fall;42(2):342–64.
18. RAPPLE B. A new model of librarian education for the networked environment. Paper presented at the 8th National Conference of the Association of College and Research Libraries, Nashville, April 11–14, 1997.
19. OLANDER B. Problem-based learning in LIS education. Paper presented at the First British-Nordic LIS Conference; May 22–24, 1995; Available on the Internet at: ⟨http://epip.lut.ac.uk/bailer/24-oland.htm.⟩
20. IBID.
21. DETLEFSEN, op.cit., 360.
22. OLANDER, op. cit.
23. University of Wisconsin–Milwaukee, School of Library and Information Science [Web document]. SLIS Bulletin, 1996–97. [cited 2 March 1998] Available from Internet at: ⟨http://www.slis.uwm.edu/html/course.description.frame.html.⟩

APPENDIX A

Student questionnaire

A. Respond to each of the following statements by circling the number which most closely matches your opinion, 5 = totally agree and 1 = totally disagree. [Response options have been removed to save space.]

1. I feel I have an understanding of the literature of the health sciences.
2. I understand the basic patterns of communication (formal and informal) among scientists.
3. I understand the organization of health care in the U.S. in general.
4. I understand the role of the health sciences library within the health care system specifically.
5. I am aware of the hierarchical system of health sciences libraries in the U.S.
6. I am aware of the major services and/or products offered by the National Library of Medicine.
7. I could discuss several major NLM projects of the last 10 years.
8. I am confident in my ability to use Index Medicus.‡
9. I am confident in my ability to use MeSH.
10. I am cognizant of the challenges of being a health sciences librarian.
11. I would be comfortable selecting and/or recommending sources of consumer health information.
12. I am aware of current trends in health sciences librarianship.
13. I feel competent to search the LIS literature to find information on a problem or issue related to health sciences librarianship.
14. I am aware of how health sciences librarianship has changed in the past 20 years (i.e., how technology has affected what HSLs do).

B. For the following questions, circle YES if you feel you have a general understanding of the content and use of sources within each group, NO if you don't:

Indexes and abstracts (except Index Medicus)
Biographical directories
Drug information sources
Historical bibliographic sources
Index Medicus
Handbooks and manuals (fact finding sources)
Medical dictionaries and terminology sources.

C. Knowing what I know now, I would also like to have covered the following topics:

D. Knowing what I know now, I feel coverage of the following topics could have been reduced or eliminated (please indicate reduced or eliminated):

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‡ At the time the courses were taught, there was a separate course covering retrieval of health sciences information via electronic sources, although a cursory introduction to MEDLINE searching was included. As of 1998, information retrieval from electronic sources (primarily MEDLINE and the Internet) has been incorporated into this course.