Problem-Based Learning: Potential Application in a Hospital Setting

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Problem-based Learning:
Potential Application in a Hospital Setting

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By

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Faculty Advisor

Date: 6/03/03

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Director
Abstract

Background: Problem-Based Learning (PBL) has been incorporated into the curricula in many medical schools. It has also spread into schools of health sciences, nursing, public health, business and other professional education programs. The skills necessary for effective problem-based learning as well as the behavioral elements, which may be attributed to effective problem-based learning, are generally the characteristics that employers seek when making staffing decisions. This paper proposes that Problem-Based Learning is an appropriate adjunct to traditional staff development methods.

Method: A group of volunteers (7) was solicited from the Respiratory Therapy staff at a University Hospital. The group participated in a PBL exercise. Upon completion of the PBL exercise the group was asked to complete a survey. The data collected included: experience in the field and familiarity with education formats other than PBL. The group was asked to compare PBL to other education formats. Positive and negative perceptions of PBL were noted.

Results: The average professional experience of the group was 6.14 years with a range of 2.5 - 12 years in the hospital. The most preferred education format was the lecture; the least preferred education format was the videotape. The group had 100% strong agreement with the statement indicating that PBL provided more opportunity for interaction with participants. There was also 100% strong agreement that PBL experiences should be incorporated into the department's education plan. The group also strongly agreed (85.7%) that PBL was useful as a learning tool and relevant to clinical practice. There was slightly less enthusiastic response (57.1% strong agreement and 42.9% agreement, as to the “effectiveness” and “enjoyment” of PBL compared to other formats experienced.

Conclusions and Recommendations: Problem-Based Learning appears to be an acceptable methodology for professional continuing education and performance improvement in a hospital-based setting. The hospital-based PBL experience could be improved with careful planning to minimize interruptions and could be enhanced by incorporating web-based technology as a supplement between PBL sessions.
PROBLEM-BASED LEARNING: POTENTIAL APPLICATION IN A HOSPITAL SETTING

Introduction

Problem-Based Learning (PBL) in medical education had its start at McMaster University in Canada in the 1960s. A number of other medical schools adapted the McMaster model. Today, most medical schools around the world have implemented PBL into their curricula. Additionally, PBL has spread into schools of health sciences, nursing, dentistry, public health and veterinary medicine. Examples of other professions that have picked up the strategy include: schools of architecture, business, law, engineering, police science, social work and education. (Camp 1996)

One significant difference between PBL and traditional education methods is that the problem is posed prior to the student having all of the knowledge to solve the problem. Students operating in this environment must have, or develop, critical thinking skills as opposed to rote recall. The students work together to learn, as opposed to compete for grades.

Another difference is in the way learning is facilitated. Instructors in the traditional environment lecture. In a PBL environment coaching to bring out the best in the group’s performance is the objective for the “instructor.”

There is evidence that PBL students retain knowledge longer, and are better able to transfer concepts to new problems. PBL also appears to enhance self-directed learning skills. There is a nearly universal finding that graduates of PBL schools find the learning environment more stimulating and humane than do graduates of traditional schools.
Yet few of the local Health Sciences Programs, in particular Respiratory Therapy Programs, have embraced PBL based curricula whole-heartedly. Therefore graduates of non-PBL programs may not transfer the benefits of a PBL based educational experience to the work environment.

As a manager of a Respiratory Therapy Department, I am particularly intrigued with the potential for PBL as a performance improvement tool. Likely applications for PBL include: continuing education, process improvement, root cause analysis, and staff development.

Literature Search

In two literature reviews (Albanese 1993, Vernon and Blake 1993) comparing Problem-Based Learning to traditional methods of Medical education, evidence supporting the superiority of Problem-Based Learning was less than conclusive. However, the two papers agreed on data favoring PBL in two outcome areas, faculty satisfaction and study behaviors of students. Both papers recommended more rigorous studies to address the value of PBL. Despite the recommendations, the analysis by Vernon and Blake concluded that the results generally support the superiority of the PBL approach over traditional methods.

While there are statistically significant differences in “factual knowledge” favoring traditional educational methods (Vernon 1993), PBL students may be better able to integrate basic science knowledge into the solutions of clinical problems (Norman, 1992). The traditional curriculum does not sufficiently foster thinking and critical analysis (Shanley, 1994).
Interest in PBL continues to grow. PBL simply feels right intuitively. It seems to reflect the way the mind actually works (Rhem, 1998). Additionally, evidence demonstrates that PBL:

- Activates prior knowledge,
- Facilitates understanding and remembering of new information,
- Facilitates learning from each other,
- Restructures general knowledge in order to make it suitable for the problem at hand,
- Increases curiosity in problem-related subject matter. (Schmidt, 1993)

Central to the effectiveness of PBL is the ability of students to work together (Peterson 1997). Weak interaction skills among the students and the "instructor" may compromise learning. The skills necessary for successful learning include:

- consensual decision making skills,
- dialogue and discussion skills, and
- team leadership skills.

The skills necessary for effective problem-based learning as well as the behavioral elements that may be attributed to effective problem-based learning are generally the characteristics that employers seek when making staffing decisions.

Does PBL have a place in the practice environment?

Amos and White piloted a study of registered nurses enrolled in a registered nurse to Baccalaureate degree program using PBL in the curriculum for two semesters (Amos, White 1998). In that study the authors addressed PBL as a tool for teaching that enhances group work and motivates the adult learner. They noted that PBL helps the student to
identify his or her learning issues and learn to sort out all of the information to find the answers. Additional benefits observed were:

- improved research skills
- fostered professional growth and collaboration
- increased self-esteem.

Celia and Gordon used problem-based learning in combination with a preceptorship program to orient novice nurses to critical care (Celia, 2001). They concluded that the program successfully supported the novice nurses through the transition into acute care delivery. They also noted that preceptors and supervisors noted the improved self-direction and critical thinking skills of program graduates.

Daniel Goleman, author of the bestsellers “Emotional Intelligence” and “Working with Emotional Intelligence”, and co-chairmen of the Consortium for research on Emotional Intelligence in Organizations, believes that top performers, in almost any field, have a higher level of emotional intelligence. A list of competencies considered essential by Goleman includes: communicating, co-operating and the ability to resolve conflicts (Goleman, 1998). These competencies are not inconsistent with the skills required for, and developed through PBL.

Peter Senge in the “Fifth Discipline: The Art and Practice of the Learning Organization” lists five essential disciplines that are vital. They are: systems thinking, personal mastery, mental models, shared vision and team learning (Senge, 1994). These disciplines are not inconsistent with the skills required for, and developed through PBL.
Methodology

This paper proposes that PBL is an appropriate adjunct to traditional staff development methods. The purpose of this paper is to investigate the potential application of Problem-Based Learning as a supplement to traditional staff development in a hospital setting.

A group of volunteers was solicited from the staff of the Respiratory Care Services Department. Eight participants were enlisted with a clinical practice experience range of 1 – 20 years. Prior to the first meeting, a primer on PBL was distributed to the participants.

The case selected for study was prepared for first year medical students and was used successfully in the curriculum of the Ohio State University College of Medicine and Public Health (Curry 2001). The authors projected that a typical group of first year medical students would require three sessions to complete the case.

This author scheduled a PBL session with a group of seven volunteers from Respiratory Therapy Department Staff of Robert Wood Johnson University Hospital. The characteristics of the group were: 3 females and 4 males with an average experience of 7.3 years in the field and an average of 6.1 years at RWJUH. The ranges of experience were 2.5 to 15 total years and a range of experience at RWJUH of 2.5 – 12 years.

This group of experienced respiratory care practitioners was able to solve the problem during the first session. However, as the first session progressed, the group identified six learning issues, which they wanted to explore in depth. The six learning issues identified were:

- How does a spontaneous pneumothorax develop?
- How is tissue structure related to malnutrition?

- How can we calculate the volume of a pneumothorax?

- What is the mechanism responsible for pain associated with a pneumothorax?

- How is the pain associated with a pneumothorax managed?

- What is the pathophysiology of tissue damage with a pneumothorax and how does it heal?

The learning issues were logged on the PBL worksheet (Appendix A), as they were uncovered. At the end of the session, each of the learning issues was assigned to a participant for further exploration.

A second PBL session was scheduled with the group. During the second session, members of the group as assigned presented the six learning issues. The group discussed each of the learning issues after it was presented.

Upon completion of the case, a questionnaire (Appendix B) containing both Likert type and open-ended questions was distributed to participants and collected for analysis. The survey was separated into three sections. The first section collected information relative to experience in the field and familiarity with education formats other than PBL.

The next section utilized a Likert type scale to assess attitude toward acceptance and utility of PBL as an adjunct to the traditional continuing education plan. The participants were asked to indicate their level of agreement, or disagreement, with a series of statements. The results are reported as percentages of the total number of participants.
In the third section participants were offered an opportunity to respond to three open-ended questions attempting to ascertain the group's positive and negative perceptions of PBL, and to determine if the group felt that the process could be improved and how improvements might be accomplished. The responses to the open-ended questions were reviewed and "common themes" were noted. The results are reported in the text.

Results

A group of volunteers was solicited from the staff of the Respiratory Care Services Department of Robert Wood Johnson University Hospital. Eight staff members were enlisted. Seven staff members participated in the project. Three of the participants were female and four participants were male. The average experience of the participants at RWJUH was 6.14 years with a range of experience at RWJUH of 2.5 - 12 years.

The first question asked the participants to rank four educational formats most frequently utilized at RWJUH for continuing education programs. The results are shown in the Table 1 below.

TABLE 1 Ranking of continuing education formats.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Lecture</th>
<th>Videotape</th>
<th>Written Self-learning Module</th>
<th>Computer-based Learning Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>2</td>
<td>1</td>
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<td>5</td>
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<tr>
<td>6</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

Average Score 1.29 3.14 2.71 2.86

Note: The lowest score is an indication of the most preferred format.
The most preferred educational format for this group of participants is the lecture. Written Self-Learning Packets and Computer-based Learning Modules were ranked a distant second and third for preferred formats. The least preferred format for continuing education was the videotape.

The second section of the survey solicited the participants' level of agreement with each of a series of statements. The data from this section are summarized in Table 2 below.

There was unanimous strong agreement (100%) with three of the statements in the second section of the survey. Participants agreed that the clinical scenario used for the PBL session was relevant. The participants also had unanimous strong agreement with two other statements. The group agreed that the PBL process provided more opportunity for interaction and that they would like to have PBL experiences incorporated into the department's educational plan.

The participants either strongly agreed (85.7%), or agreed (14.3%), with two of the statements. The group agreed that the PBL format was useful as a learning tool. They also agreed that the issues discussed during the PBL process were applicable to current and/or future clinical experiences at the hospital.

The two remaining statements showed support for PBL but it was less enthusiastic. In response to the statements, "PBL is more effective as a learning tool," and, "PBL was more enjoyable," 57.1% of the participants' strongly agreed and 42.9% of the participants agreed. There were no undecided, disagree, or strongly disagree responses selected.

The next section of the survey asked for responses to three open-ended questions.
The first question, "What did you like MOST about PBL?" generated a number of comments with a common theme. Words like "participation", "interaction", and "working with a group" are noted in almost all of the responses. Examples of some of the comments submitted are listed below:

- "Interactions with peers, piecing together the information as a group."
- "Interactive process/opportunity to 'roundtable' with peers."
- "Refreshes/reinforces knowledge/heightens the awareness of need for further knowledge."

These comments are consistent with experiences noted in the literature.
The second open-ended question asked participants to comment on what they liked least about PBL? Two participants commented on “interruptions” during the sessions. The rest of the comments were varied. Examples of comments submitted include:

- “Therapists were paged during sessions.”
- “For it to work – everyone must be interested – everyone must be involved without interruptions.”

The third open-ended question asked the participants to comment on “what could be done to enhance the learning experience.” Responses to this question were quite varied. Recommendations noted included:

- Schedule assignments with participants when they are not in assignment.
- Maintain a log of learning issues that were explored.
- Disseminate information on learning issues via e-mail list serve.

CONCLUSIONS AND RECOMMENDATIONS

Problem-Based Learning would appear to be an acceptable methodology for professional continuing education and performance improvement in a hospital-based Respiratory Care Service. After an initial exposure to the PBL process, a group of volunteers strongly agreed that the PBL process was:

- useful as a learning tool,
- relevant to situations experienced,
- applicable to current/future clinical experiences.

The group also found that PBL was more effective as a learning tool and more enjoyable than other continuing education formats in which they participated. The group
also felt strongly that the PBL process provided more opportunities for interaction with other participants. This sentiment was also expressed as a common theme in responses to the first of the "open-ended" questions on the survey instrument. The group also felt strongly that PBL experiences be incorporated into the department's educational plan.

Despite the strength of agreement with the utility of PBL as a continuing education tool and the desire for implementation as a component of the department's continuing education plan; the group noted some deficiencies when asked to describe what they liked least about the PBL process. Interruptions during the session appeared to be significant detractors to the PBL experience.

The PBL experience could be improved with the addition of careful planning to avoid periods when staff might be interrupted during the sessions. While this will be very difficult to guarantee, it might be possible to schedule the sessions during non-peak workload periods and providing coverage for participants during the PBL sessions. Utilizing web-based supplementation between PBL sessions might also enhance the process.

Since this was the initial exposure to the PBL process. Sessions would more than likely proceed with increased efficiency and effectiveness with more experiences for the staff and facilitator.

Problem-Based Learning in a work environment is a worthy endeavor. With careful planning, well-written problems and good facilitation the benefits accrued may improve the performance of the department significantly. Potential benefits to the department that have been demonstrated to improve with PBL experiences include:

- activation of prior knowledge,
- learning from each other,
- improved self-direction,
- improved critical thinking skills,
- consensual decision making skills,
- improved team leadership skills.

A department that improves in any, or all, of these abilities will have the potential to significantly improve clinical performance, patient satisfaction, physician satisfaction and employee satisfaction.
References:


Camp, G. Problem-Based Learning: A Paradigm Shift or a Passing Fad? MEO 1996; 1:2


Appendix A

RESPIRATORY CARE SERVICES
ROBERT WOOD JOHNSON UNIVERSITY HOSPITAL
PROBLEM-BASED LEARNING WORKSHEET

<table>
<thead>
<tr>
<th>PROBLEM:</th>
<th>FACILITATOR:</th>
<th>DATE:</th>
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<table>
<thead>
<tr>
<th>What do we know?</th>
<th>What do we need to know?</th>
<th>Why do we need to know it?</th>
<th>What are the specific learning issues?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>
Dear Colleague,

Thank you for participating in the Problem-Based Learning Program. Your opinions are very important to the Respiratory Care Department Leadership. Please take a few minutes to complete the survey below.

1. How many years have you practiced respiratory care at RWJUH?

2. The respiratory therapy department at RWJUH utilizes several formats for continuing education. Please rank the listed education formats in order of your preference. (use "1" for most preferred).

   - lecture
   - videotape
   - written self-learning module
   - computer-based learning module

For each of the statements below, indicate whether you strongly agree (SA), agree (A), are undecided (U), disagree (D), or strongly disagree (SD).

<table>
<thead>
<tr>
<th></th>
<th>SA</th>
<th>A</th>
<th>U</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The PBL format is useful as a learning tool.</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
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</tr>
<tr>
<td>2. The case discussed was relevant to clinical situations I have experienced.</td>
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</tr>
<tr>
<td>3. Issues discussed during the PBL process will be applied to current/future clinical experiences at RWJUH.</td>
<td>[ ]</td>
<td>[ ]</td>
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<td>[ ]</td>
</tr>
<tr>
<td>4. Compared to other continuing education formats that I have experienced PBL:</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>a. is more effective as a learning tool;</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>b. was more enjoyable;</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>c. provided more opportunity for interaction with participants</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
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</tr>
<tr>
<td>5. I would like to have PBL experiences incorporated into the department's education plan.</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
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<td>[ ]</td>
</tr>
</tbody>
</table>
6. What did you like most about PBL?

7. What did you like least about PBL?

8. If the PBL format is incorporated into the department's education plan, what could be done to enhance the learning experience?