Problem-Based Learning: Any Influence in Respiratory Care?

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In this issue of RESPIRATORY CARE, Will Beachey presents findings from his study comparing problem-based learning (PBL) with traditional approaches in the preparation of respiratory therapists. The purpose of Beachey's mixed-methodology study was to determine if there are differences between PBL and traditional respiratory therapy curricula in terms of graduate and employer satisfaction ratings on standardized surveys and national board examination scores. The retrospective study was focused on baccalaureate-level respiratory therapy education, not only because it helped control for confounding variables, but also because of the limited use of PBL in respiratory therapy education.

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Problem-based learning as a teaching strategy and curricular design began over 30 years ago at McMaster University in Canada.[1] Using problems based on actual clinical cases as the focus in medical education evolved after years of faculty and student frustration with the traditional lectures and challenging clinical experiences.[1] PBL shifted the medical curriculum from a faculty-centered approach to a student-centered, interdisciplinary process. The emphasis of PBL is based on learning (what students do), rather than teaching (what the faculty do). Hybridization of the McMaster PBL approach has occurred at numerous institutions and was first suggested as a learning strategy for respiratory therapy education in 1993.[2] PBL has further been proposed as a strategy not only for preparing students, but also for continuing education to expand professional roles for respiratory therapists.[3,4] In addition, relationships between PBL, critical thinking, and evidence-based medicine have been described for respiratory therapy education and practice.[5,6]

The continued use of PBL in health care and higher education arises from the recognition that students retain minimal information obtained from traditional didactic teaching and have difficulty transferring knowledge to new experiences and settings such as clinical rotations. PBL provides an environment in which students can draw upon prior knowledge, learn within the real-world context, and reinforce the knowledge through independent and small group work. Introductions to PBL with specific applications and cases in respiratory therapy have been published and promoted.[4] Although there are many variations and applications of PBL from the McMaster or "purist" approach to case-based approaches, the emphasis on these elements are generally consistent: learning organized around problems or cases; student-directed, active learning; development of the learner's communication skills; consideration of the continuum of wellness to illness; and, attention to biological, clinical, psychosocial, ethical, financial, and practical issues.

Problem-based learning can be used as a framework for modules, courses, or entire curricula. In my own experiences with PBL in physical therapy, we have shifted from an entire curriculum using the purist PBL approach to a hybrid, case-based approach to maximize faculty resources. In our respiratory therapy program we have incorporated a variety of PBL approaches, including one course using the McMaster PBL, hybrid PBL courses, and case-based approaches. The differences between case-based and PBL can be difficult to ascertain. In a study examining both expert and nonexpert tutors, Hay and Katsikitis determined the two are similar.[7] The major difference is that with case-based courses, the problem is accompanied by resource materials and questions; with purist PBL, only the problem is provided.

This study by Beachey is the first published investigation across institutions of PBL's effectiveness, compared to traditional lecture-based strategies, in respiratory therapy education.[8] To date, only one preliminary report[9] and one abstract[10] have been published in which National Board for Respiratory Care examination scores were compared for consecutive graduating classes before and after conversion from a conventional to a PBL curriculum. No studies have been published comparing graduate and employer satisfaction with PBL and conventional respiratory therapy curricula based upon the graduate's cognitive competencies (eg, ability to make sound clinical judgments and ability to recommend appropriate procedures) or affective competencies (eg, effective communication ability, self-directedness, ability to work effectively with supervisory personnel, professional organization membership, and

ethical/professional behavior). This study also examined whether any of the measured variables (such as teaching-learning strategy, or survey ratings in cognitive, psychomotor, and affective areas) are associated with performance on the national board examinations.

Beachey's findings are consistent with the literature, in which many studies confirm that PBL graduates perform as well on standardized examinations as graduates prepared by conventional methods, are generally more satisfied with their educational experience, and are more self-directed in the course of their studies. However, Beachey's findings on employer ratings were not consistent with other studies. For example, a very recent study comparing critical thinking and communication skills during a dental residency found that dental residents prepared using PBL were rated significantly higher in communication with patients, critical thinking, independent learning, performance in small groups, self-assessment, and teamwork.[11] Although Beachey found no significant differences in the overall employer ratings for either group, there were some differences reported by item. The literature does not support the unexpected finding in this study that the employers rated the PBL graduates lower on some of the survey items, such as communicating effectively. As Beachey points out "it is especially difficult to explain why employers would rate PBL graduates lower as effective communicators than traditional graduates, considering the predominant role communication skills play in small-group PBL methods." Beachey's findings and explanations may indeed be a reflection on reactions to graduates who have been prepared to question, and on how the role of questioning is viewed relative to other attributes, such as teamwork, in respiratory therapy. Other possibilities to explain any differences may be lack of interrater reliability, as well as differences in sample sizes, with a much larger percentage of surveys (78%) received for traditional graduates than those received for PBL graduates (42%).

The problems in applying the scientific method that is typically used in clinical research to educational research are well known and difficult to overcome. Most respiratory care programs have too small a class size to conduct a study within a narrow time frame, consistent with academic calendars. Multi-program studies, as conducted by Beachey, help address the issues when class sizes are small; however, it opens up a different set of variables, such as standardizing the "treatment," which in this case is PBL, and its effects on the outcomes.[12] Even graduate outcomes, including cognitive, psychomotor and affective, are rater-dependent and extremely hard to assess from multiple employers, even when the instruments are standardized. Researchers disagree about whether educational experiments can illuminate the effects of a curriculum-level intervention such as the application of PBL. Many maintain that interventions at the curriculum level can never be uniform, are impossible to blind, and cannot achieve an unadulterated outcome attributable only to the intervention.[13–14] In addition, objective student assessment methods based on traditional methods, such as multiple-choice examinations, may not be sensitive to PBL's effectiveness. Despite the limitations, researchers, predominantly in medical education, have conducted numerous studies comparing PBL's outcomes with those of conventional lecture-based instruction.

Beachey's publication is an important contribution to the respiratory care literature because it provides specific findings on the influence of PBL in respiratory therapy, albeit with the limitations that he addresses. We need further study of the effectiveness of PBL to prepare respiratory therapy graduates with the knowledge and skills needed to practice respiratory care. The limited use of PBL in respiratory care, the lack of published studies, and the limitations of educational research have made it difficult to draw solid conclusions. Additional uses of PBL and educational research comparing PBL to traditional methods are needed to determine whether PBL is having any real influence in respiratory care.

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