Comparing Problem-Based Learning with Case-Based Learning: Effects of a Major Curricular Shift at Two Institutions

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Abstract

Purpose

Problem-based learning (PBL) is now used at many medical schools to promote lifelong learning, open inquiry, teamwork, and critical thinking. PBL has not been compared with other forms of discussion-based small-group learning. Case-based learning (CBL) uses a guided inquiry method and provides more structure during small-group sessions. In this study, we compared faculty and medical students' perceptions of traditional PBL with CBL after a curricular shift at two institutions.

Method

Over periods of three years, the medical schools at the University of California, Los Angeles (UCLA) and the University of California, Davis (UCD) changed first-, second-, and third-year Doctoring courses from PBL to CBL formats. Ten months after the shift (2001 at UCLA and 2004 at UCD), students and faculty who had participated in both curricula completed a 24-item questionnaire about their PBL and CBL perceptions and the perceived advantages of each format

Results

A total of 286 students (86%–97%) and 31 faculty (92%–100%) completed questionnaires. CBL was preferred by students (255; 89%) and faculty (26; 84%) across schools and learner levels.

The few students preferring PBL (11%) felt it encouraged self-directed learning (26%) and valued its greater opportunities for participation (32%). From logistic regression, students preferred CBL because of fewer unfocused tangents (59%, odds ration [OR] 4.10, $P = .01$), less busy-work (80%, OR 3.97, $P = .01$), and more opportunities for clinical skills application (52%, OR 25.6, $P = .002$).

Conclusions

Learners and faculty at two major academic medical centers overwhelmingly preferred CBL (guided inquiry) over PBL (open inquiry). Given the dense medical curriculum and need for efficient use of student and faculty time, CBL offers an alternative model to traditional PBL small-group teaching. This study could not assess which method produces better practicing physicians.

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Contemporary medical practice employs a variety of small-group, case-based discussion strategies.[1–3] Small-group teaching methods emphasize teamwork and problem solving, yet they are extremely faculty- and resource intensive.[4] Controversy remains about which method of small-group learning is most effective, time efficient, and palatable to the learner and teacher. In this study, we assessed two methods of small-group teaching: the classical problem-based learning (PBL) method[5] and an innovative case-based learning (CBL) strategy.[6]

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Background

The two teaching methods

In PBL small groups, the group focuses on the process of discovery by learners—to stimulate problem solving, independent learning, and teamwork.[7] Usually, facilitators play a minimal role and do not guide the discussion, even when learners explore tangents. In this format, learners are presented a problem, often using a clinical case as a starting point for discussion. Learners then have time to struggle and define the problem, explore related issues (during and/or after sessions), and grapple with problem resolution. Compared with traditional lecture-based educational approaches, PBL instructional methods have demonstrated improved learner/faculty satisfaction but without changes in test scores from responses to multiple-choice questions.[8] Many hypothesize that when confronted with a new problem, learners participating in PBL instruction may emerge as better problem solvers than would learners from purely lecture-based instruction. Some have called PBL an *open inquiry approach.*

In CBL small groups, the group focuses on creative problem solving, with some advance preparation.[9] Discovery is encouraged in a format in which both students and facilitators share responsibility for coming to closure on cardinal learning points. As in the PBL format, learners are presented with a clinical problem and have time to struggle, define, and resolve the problem. However, when learners begin to explore tangents, the facilitators will use guiding questions to bring them back to the main learning objective. Additionally, students prepare in advance for the session, and they may ask questions of the local

experts during the session. They typically have little postsession work, although this varies depending on the group's interest in pursuing additional issues. Some have called CBL a *guided inquiry approach.* Key similarities and differences between these two methods are illustrated in Figure 1.

PBL proponents argue that PBL methods encourage lifelong learning, simulate clinical practice, encourage curiosity, and create a broader understanding of the complexity of medicine.[5,10] PBL detractors argue that the PBL process is time inefficient, frustrating for time-pressured medical learners, and often leads to erroneous conclusions.[9] Additionally, there is little guarantee that the students will learn how to apply the material necessary for clinical practice in the absence of appropriate clinical direction.[1] PBL detractors also state that the presence and expertise of the faculty is wasted if it not harnessed in more than a passive manner.

CBL proponents argue that CBL still provides for open-ended exploration of issues and encourages debate, discussion, and exploration of ambiguity while providing more structure for the learner in an efficient, goal-directed manner. Further, CBL proponents argue that CBL helps focus the learners on the key points of a clinical case, encourages a structured approach to clinical problem-solving, and allows each learner to be a "content expert" for part of the session. Importantly, they argue that facilitators can correct incorrect assumptions of the learner—which usually does not happen in PBL. Faculty can moderate the influence of louder, more contributory students. CBL detractors argue that providing answers (or direction towards answers) to key clinical or ethical questions effectively stifles curiosity. Detractors also argue that without intensive faculty development, the CBL format may encourage faculty to lecture instead of facilitate. They feel that CBL encourages a spoon-feeding mentality of learners, in which they always expect their peers or teachers to have the correct answers.

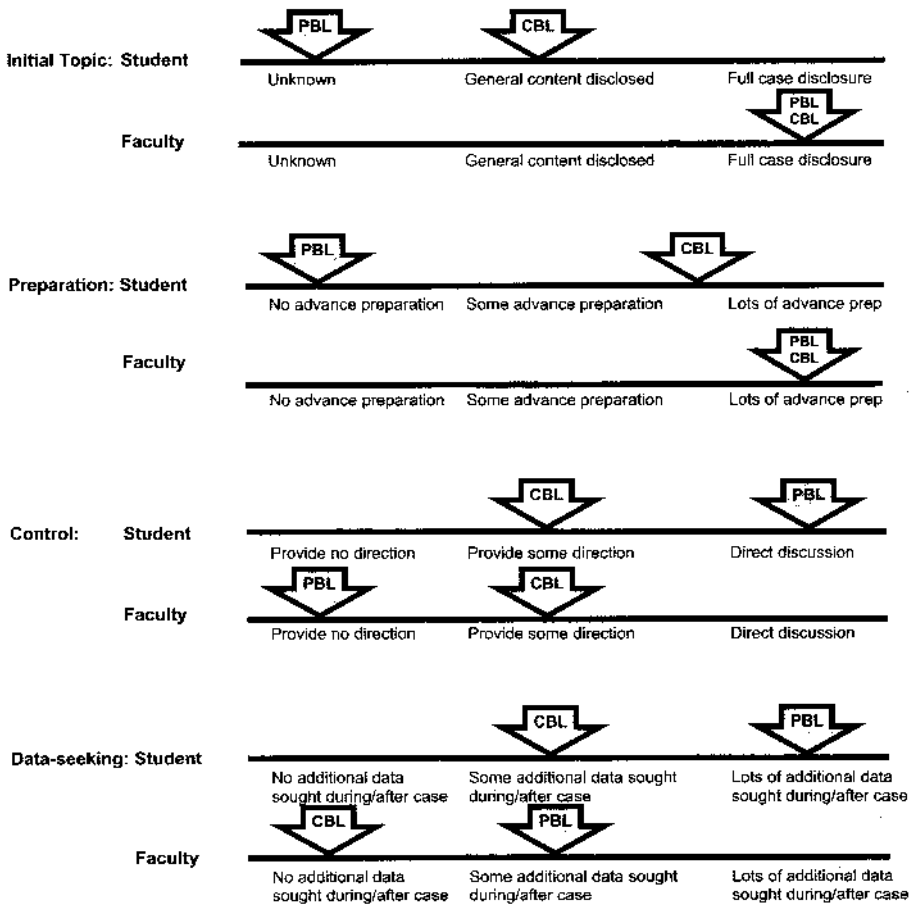

Figure 1 Differences between two small-group instructional methods: problem-based learning (PBL) and case-based learning (CBL).

To date, no study has directly compared these extremely different types of small-group teaching methods. Previous barriers to this comparison included the need to train facilitators in both methods, the preference of faculty for one particular method of small-group teaching, and the need to recreate a new curriculum for students with the alternate method.

Curricular shift at two academic health centers

The University of California, Davis, School of Medicine (UCD) and the University of California, Los Angeles, David Geffen School of Medicine at UCLA (UCLA), each undertook a shift in teaching methods from a longitudinal PBL course to a longitudinal CBL course, via an existing small-group course called "Doctoring." This shift occurred between 1998 and 2001 at UCLA and between 2002 and 2004 at UCD. Although the PBL course at each school had received good reviews from students and faculty based on standard course evaluations, the shift was undertaken to assess the impact of a guided inquiry approach over an open-ended approach to small-group teaching.

At the time of the change from PBL to CBL, the surveyed students had at least one year of experience with the PBL format, with similar content and learning issues. At UCLA, these medical students were finishing the second year (with PBL in their first year) and their third year (with PBL in their first two years). At UCD, these medical students were finishing their third year (with PBL in their first two years).

At both schools in the PBL format, students were presented with a clinical case using a sequential management problem (Table 1). Over the course of multiple sessions, students identified their own learning issues for the case, explored those issues, and brought back new material to the small group to inform the rest of the group. Many of the cases were triggered by standardized patient interviews. Video-trigger tapes or standardized patient interviews were used to illustrate key points, and students were encouraged to seek outside sources of information to share with the group on topics. The topics related to clinical management, etiology, epidemiology, and pathophysiology. Typically,