

FEAR & LOATHING IN PBL: FACULTY REACTIONS TO DEVELOPING PROBLEM-BASED LEARNING FOR A LARGE RESEARCH UNIVERSITY

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Most documented cases of training faculty to use Problem-Based Learning (PBL) focus primarily on generating enthusiasm for the goals and learning outcomes of PBL over more traditional methods. We trained a group of 10 faculty and 9 graduate TAs at the University of California at Irvine, a large research institution, to use problem-based learning in their introductory classes. As a result of our efforts, we gained insight into what else is needed for such faculty adoption of PBL, above and beyond enthusiasm or empirical evidence of the method's success. In this paper we argue that willingness to fundamentally change teaching practice, skills to manage PBL logistics, and a positive attitude toward student reaction and competence are also necessary. Through extensive feedback sessions, collaborative role-playing, and resource identification, we were able to facilitate some changes among our faculty in each of these areas. Finally, we found that our own experience as trainers in our faculty Institute were not unlike those of the faculty we trained.

INTRODUCTION

Faculty at large research universities have a reputation in some circles for maintaining a narrow focus on their research interests to the exclusion of all else, including teaching students. Currently, however, there has been a resurgence in teaching innovation efforts at the large research institution. Along with a new focus on teaching, however, comes some difficulty. "Teaching," as such, is being redefined, and faculty schooled in traditional methods may have a hard time making the change. According to some researchers in higher education, the old *teaching* model, emphasizing content coverage and information dissemination, should be replaced by a model which focuses instead on *learning*, with student understanding as the driving force behind curricular goals (Barr & Tagg, 1992). The main characteristics of problem-based learning - student-centred learning goals, self-directed investigation, and collaborative inquiry - place PBL squarely on the learning end of this shift. Consequently, professors, departments, and even entire universities have adopted PBL as their primary mode of accomplishing curricular goals, largely because of these characteristics. But adoption of PBL is not an easy process, as we discovered in our attempts

to train University of California faculty to design cases and use PBL in their undergraduate classes.

Much of the existing literature on faculty adoption of problem-based learning has focused on testimonials of PBL's success in student learning outcomes over traditional methods (e.g., Allen, Duch, & Groh, 1996; Woods, 1996). White (1996) acknowledges that logistical challenges can sometimes dampen initial enthusiasm, but he argues that many faculty are disillusioned with the lecture-based model and so welcome PBL as a fresh change. The basic assumption seems to be that faculty need only be convinced of PBL's effectiveness in order to embrace it and want to use it for themselves. Based on our experiences working with faculty at a large research university, in this paper, we complicate that assumption in several crucial ways. We argue that in order to successfully adopt problem-based learning, faculty not only need enthusiasm for PBL's outcomes, but also willingness to fundamentally change their teaching practices, crucial abilities to manage PBL logistics, and a positive attitude about student reactions and student competence. We discuss what happens when faculty lack one or more of these attributes and our efforts to cultivate changes in each area through professional development.

THE UC IRVINE FACULTY INSTITUTE

Last year when our program was presented at this conference, we were about to embark on our first iteration of the Problem-Based Learning Faculty Institute at UCI. We had selected 10 faculty and 9 teaching assistants to participate from disciplines ranging from the humanities to engineering. Interestingly, 12 of the 19 participants were from the social sciences.

The goal of the Institute was for faculty to incorporate PBL into their lower-division, general education (or "breadth") courses, preferably a large one (50+ students). Having now implemented the institute once, we have reflected on both our own experiences as facilitators and of faculty attempting to adopt PBL as a teaching methodology.

For the first month of the Institute, our seminar met once a week during the winter quarter of 2000 and then every other week, for a total of seven two-hour sessions. We decided it was best if faculty experienced a modified version of PBL themselves, thereby affording the participants an opportunity to both see and experience the methodology. The Institute was designed to incorporate some "assisted" PBL: we did provide them with a binder of readings on PBL, as well as a sample PBL problems taken from the University of Delaware's PBL biology curriculum. Their own PBL task was to create a PBL case problem and plan how they would implement it in a course. We hoped that both the readings and assignments would give faculty a better idea of just what PBL was (and how strikingly different it would be from the lecture model) before they began designing their own PBL curriculum. The main focus of the institute was on designing PBL cases, facilitating student PBL work in the classroom, and using collaborative inquiry in PBL. We designed assignments and activities for each of these areas.

An unresolved issue, however, for both the facilitators and the faculty, was whether PBL was at all suited to large undergraduate courses, especially those outside of the sciences. The PBL literature is filled with cases of graduate and professional programs re-designed to incorporate PBL. Students in these programs are older, have already chosen a profession,

and are engaging in it. Unlike those students, undergraduates in introductory courses sometimes resent these general education required courses. For some, the courses are an unnecessary hurdle to jump in order to get to their true interests in other areas. Student motivation is thus a major issue. We also discovered previously that not all students welcome pedagogical variation from lectures. Most of the PBL literature describes graduate and professional programs that have wholly gone over to PBL (e.g., Barrows, 1986; Gjiselaers, 1995; Heycox & Bolzan, 1991). Programmatic PBL, therefore, is not aberrant within the culture; its methods are reinforced from one course to the next. Our faculty would be in the position of being iconoclasts within their own departments. Students also often fear any new methodology in case it somehow disadvantages them in comparison to non-PBL sections of the courses. And, of course, despite students' complaints about the boredom of lectures, having to take on a more active and pro-active role in their own learning might be met with considerable resistance.

Obviously, some faculty concerns and hesitations in adopting PBL would be legitimate, given the nature of the situation at UC Irvine as described above. We argue, however, that three major challenges outlined here - willingness to change teaching practice, ability to manage PBL logistics, and attitude about student reaction and competence - are not unique to Irvine faculty and should be considered in any PBL development program. In the following sections we address each of these challenges in detail and describe our efforts in the Institute to help participants overcome hurdles in each area.

FACULTY WILLINGNESS TO CHANGE TEACHING PRACTICE

Eight out of ten of our faculty had taught their introductory undergraduate classes exclusively in lecture mode prior to participating in the Institute. For some this was due to an opinion that lecture *en masse* was the only way to handle a class of several hundred students, and for others this practice was due to a lack of familiarity with other options. White's (1996) argument that many faculty are disillusioned with the lecture model was thus only partially true for our participants; the actual picture was somewhat more complicated. When we asked faculty at the outset of the Institute why they were interested in learning how to use PBL, their responses for the most part contained a litany of failed student learning goals. Faculty wanted a change in what students learned, the kind of work students produced, and the skills students developed as a result of taking their courses. With few exceptions, however, they did not describe any dissatisfaction with their own teaching (e.g., "I'm bored with lectures," or "I feel disconnected from my students"). The conclusion that can be drawn from these attitudes is that faculty were disillusioned with the *outcomes* of the lecture model, but not with the assumptions or practices germane to the model itself.

The lecture model is largely based on the assumption that students learn by passively receiving information from an outside authority. Several metaphors have arisen to describe this assumption, from Locke's *tabula rasa*, in which the student is a blank slate awaiting the teacher's inscriptions, to what Popper calls the "bucket theory of the mind" (1979). Regardless of whether the student is figured as a slate or a bucket, the flow of knowledge is always from teacher to learner. The idea of the student teaching herself new knowledge, which is fundamental to problem-based learning (Barrows, 1996), does not fit within this transmission model. Faculty operating on this assumption about the nature of learning thus naturally have difficulty adopting PBL, in which students are presented with problems before they have received any authoritative information.

In our Institute, participants who were not yet ready to fundamentally change their teaching attempted to get around the PBL-versus-lecture dichotomy in interesting ways. Their PBL problem cases were often designed as *applications* of what students had already learned in lectures, rather than as vehicles for students to learn new information. Another loophole was to design the problem such that it required students to learn new *skills*, such as research using a database or multimedia presentation, but not new content. When we asked faculty about these changes from our “design a PBL case” assignment, most responded that they wanted students to have the problem-solving experience, but they didn’t think students would be able to even approach the problems without receiving some core content first in the form of lecture. Another challenge was that faculty often did not even realize that they were not adhering to the norms of PBL, so entrenched were they in old ways of knowing and doing and respective roles for teachers and students.

One way of looking at these difficulties faculty encountered is in terms of Barr and Tagg’s paradigm shift (1992). The authors describe how individuals and institutions which have adopted the student-centred goals of the learning paradigm will often attempt to address those goals within the framework of the teaching paradigm, rather than changing the entire framework of the instructional environment to suit the new goals. In our institute, faculty were committed to students developing greater discipline-specific abilities (e.g. scientific method) and general skills (e.g. library research), as evidenced by their lists of student goals. They tried to address these goals, however, within a pedagogical framework that was still largely lecture-based.

Our primary method of dealing with this difficulty was through the notion of practice. We continually asked faculty how they expected students to be able to solve an “application” problem without any previous experience using the kinds of skills they would have to enact in analysing the PBL case. We pointed to their lists of goals and asked them to explain what would be occurring *during class* that would help students meet those goals. Gradually some (but not all) faculty became convinced that PBL cases rather than exclusively lectures should occupy class time. This realization required massive changes in how they wrote their PBL problems. Some techniques we used to help them with re-writes were variations of read-around and peer review dyads. Faculty and teaching assistants from one class were coupled with a faculty member and TA from another. They exchanged drafts of the cases they were developing and got feedback from one another. At other times, the facilitators provided extensive written feedback, which the faculty found to also be very useful. We cannot argue that these faculty have successfully navigated the paradigm shift until all have implemented their courses; however, on the course design end of the teaching equation, they seemed to be heading in the right direction.

FACULTY ABILITY TO MANAGE PBL LOGISTICS

Once faculty had accepted the idea (some grudgingly) that students would have to work on their PBL cases and other interactive tasks in class, there arose a great deal of insecurity about how to manage these activities. As stated previously, most faculty’s previous practice in undergraduate classes consisted almost entirely of lecturing to large groups. If an interactive component of a given class existed, it was primarily realized in discussion sections facilitated by a graduate teaching assistant. Thus the idea of using collaborative inquiry during the large group section of a course containing over 100 students was intimidating, if not downright terrifying, to most of our faculty. But the admittedly daunting task of

monitoring at least 20 groups at once was not the only logistical fear. Many of the participants admitted to avoiding collaborative groups even in their small classes, due to preconceived notions of how students learn, and to feeling uncomfortable and out of control.

In our work in faculty teaching development, we have discovered that some faculty are quite hostile to the notion of group work. Many believe that students should be able to learn the material as they did - through the auditory modality. Audition is the standard college-level learning modality, and it can be done singularly. In addition, the American mania for independence underscores the model of the lone student "figuring it out for herself."

Other concerns raised about the logistics of using collaborative groups were as follows: How would faculty ensure that student groups were staying on task during class, if there were too many groups to effectively monitor them all? How would they know if one student ended up doing the majority of the work for a whole group? How could they prevent opinionated students from dominating their groups' efforts? How did one go about even *forming* collaborative groups in a large lecture class? How could pods of students work together in a lecture hall with fixed seating? How could one instructor and a few graduate TAs possibly respond to the number of questions that were bound to come up during group work in a large class? Would there possibly be enough time for groups to share their results with the class? Who was going to be responsible for monitoring each group's progress on their cases, and who was going to be stuck with the task of assigning individual grades for collaborative projects? Interestingly, not one of these issues is strictly unique to PBL; these are challenges faced by instructors using collaborative groups in any curriculum. Whether students are staying "on task," and whether they are doing their own work, are concerns often presented, as though students are always on task and doing their own work during a lecture. Silence and the lack of interaction often lull the instructor into a false sense of security about lecturing.

As with the lecturing problem described in the previous section, when it was time for faculty to generate their own solutions to these problems, they initially resorted to old models. Faculty whose courses were accompanied by discussion sections immediately suggested that the best option was for students to work in their collaborative groups during sections, rather than during the large lecture meetings. We attempted to convince participants that this was problematic for several reasons. First, it creates a rift between lecture and discussion, wherein the professor does not directly participate in students' case-based problem solving. Second (and we think more revealing) is the fact that the discussion strategy solves relatively few of the fears outlined above - it merely shifts the responsibility for dealing with them from the professor to the teaching assistants. Most of our faculty eventually realized that this was not a real solution.

To address the fears about group dynamics (staying on task, freeloading, and dominating students), we had the faculty work in groups themselves and provided detailed instructions for assigning group roles, individual responsibilities, and timekeeping. From the third session on, the faculty themselves worked in various smaller groups, most often paired with others from the same or like disciplines. In processing sessions after these group activities, we focused on group dynamics. We collectively devised various group roles and guidelines to address some of the issues raised. We also provided them with some additional models that we had developed. Through playing group roles themselves (timekeeper, recorder, facilitator, etc.) and working on collaborative tasks, faculty were able to experience PBL from the perspective of the students. This helped them reflect on what kinds of group structures and guidelines might be useful for their own classes. Interestingly, when left to

their own devices, some faculty themselves displayed the kinds of collaborative behaviours they feared in their students. Some dominated group discussions, some contributed little, while still others tried to use their group time to discuss tangential or unrelated topics. Introducing group guidelines and specific roles was thus not only useful as a model for students; it also made faculty groups in the Institute more equitable and productive.

The issue of the space in which collaborative work would take place proved to be a major stumbling block for some faculty. They seemed convinced that effective group work was simply impossible in a lecture hall with fixed seats. Consequently, although there were only 19 participants, we conducted one session in a large lecture hall to simulate the kind of room most of them were likely to encounter. We had them participate in a “jigsaw” activity: groups were spread out around the room and each group was given a different concern about collaborative groups. Each group was given a specified amount of time to brainstorm potential solutions for one of the remaining challenges outlined above: how to form groups in a large class, how to assign individual grades for group work, and how to monitor progress. Groups used flipcharts to record their ideas. When time was called, the reporters from each group (one individual identified at the start of the activity) moved clockwise to one of the other groups. After a given time, the reporters moved clockwise to yet another group.

This jigsaw activity in the large lecture hall served two functions: participants not only generated strategies for addressing the three aforementioned problems with collaborative groups, but they also experienced first-hand, the possibilities of going beyond the obvious and intended functions of the lecture hall setting. It is difficult to convey the excitement and energy generated amongst participants through seemingly simple, yet non-standard, activities like taping flipchart notes up on the walls of the lecture hall, sitting backwards in lecture hall seats to work with group members seated to the rear, moving back and forth between different areas of the room, using the aisle spaces for work, etc. While faculty left that session not thoroughly convinced of how these tactics would work with much larger classes, they nevertheless were open to the possibilities of the lecture hall as an open and mobile environment for collaborative inquiry.

FACULTY ATTITUDES ABOUT STUDENT REACTIONS AND COMPETENCE

The previous two issues of faculty willingness and ability dealt with characteristics of the participants. We were able, for the most part, to help faculty expand their ideas of classroom activities in PBL and give them tools with which to design cases and manage logistical challenges. The last issue that faculty were hesitant about however, that of student reactions and competence, dealt with a problem external to themselves. As described earlier, there were legitimate reasons to suspect that students might not wholly embrace PBL, since it would be very different from the curriculum in general education courses they were used to. However, we as facilitators were not prepared for the extent to which faculty displayed very skeptical attitudes toward how students would actually behave in the PBL courses being designed.

Earlier on in the Institute, faculty were asked to write detailed descriptions of their target course and their students. Faculty identified their assumptions and expectations of the course and the undergraduates. In their descriptions, some distinct patterns of concern evolved: lack of student motivation; poor writing and public speaking skills; English as a Second Language limitations; and ignorance of even basic library search strategies. As the Institute progressed,

even more fears regarding student performance emerged. These concerns fell into two basic categories: community responsibility and competence. Community responsibility describes the following types of behavior: coming to class on time (or at all), coming to class prepared with the readings and/or homework, academic honesty, listening to other students in groups and giving legitimate feedback when asked, etc. Many faculty also doubted that the majority of students in their courses possessed the following competencies necessary in order to accomplish PBL tasks: library research skills, ability to follow directions, critical thinking, self-direction and self-monitoring, time management, and even basic writing skills. Despite the fact that they had amassed effective case assignments and logistical tools, these fears about student performance were significantly dampening faculty enthusiasm. Once they started to seriously consider everything that might go wrong on the student end, some participants began talking about scaling back their PBL assignments - to the extent that the resultant activities would hardly resemble PBL at all.

To address these issues, we presented faculty with a number of resources and ideas, from which they could pick and choose depending on their areas of greatest concern. We detailed campus resources that could provide assistance with student writing, library search skills, English proficiency, and time management. We also suggested a number of course policies, regulations, etc. that might help curb student loafing with regard to community responsibility. Interestingly, while participants accepted the options for improving student competency as valuable resources, they were dubious about the effectiveness of any method for affecting students' level of community responsibility. Faculty appeared to be making the attribution that skills can change and improve, but that community responsibility is a static characteristic of individuals - no amount of instructional manipulation could change it.

Even at the end of the Institute, faculty still seemed unsure about how their students would perform on PBL problem solving. They were for the most part pleased with the cases they had written, and they were more confident, than when they started, about their ability to manage logistical problems, but their expectations for student behavior were still low. On their evaluations of the Institute learning experience, participants rated how confident they felt about their students' willingness and ability to complete the PBL assignments. This area received one of the lowest ratings: a middling score of four on a seven-point scale.

We are concerned that these low expectations may contribute to a less-than-ideal implementation of PBL, when faculty participants actually teach their courses. We, as facilitators, also have many questions about how students will respond to various PBL-related issues; however, at the point of this writing, only one faculty member has incorporated PBL into his course. Not surprisingly, this particular faculty member also had the highest reported confidence in his students' abilities and attitudes. His course was largely successful, and he was enthusiastic about the outcomes he observed. The rest of the participants will teach their courses later this year. It will thus be a while before we have data on student response and actual classroom issues arising from the application of PBL on a larger scale.

FACILITATOR WILLINGNESS, ABILITIES, AND ATTITUDES

Since we encouraged faculty to be reflective about their own teaching practices, it seems only fair that we analyse our own willingness, abilities, and attitudes as facilitators in this endeavour. First, we had to determine how much time *we* were willing to put into the project. As the only professional faculty development specialist on campus and the director of a unit,

this project was just one of the director's many duties. (The presence of the project assistant helped a great deal in this area of time commitments, however.) We had promised not only to design and implement the Institute, but once the faculty conducted their PBL-enhanced courses, we were to videotape a number of their class sessions, analyse the tapes, and be on call for consultation. In that sense, our time commitment went well beyond the one quarter that faculty typically are responsible to students for teaching a course.

We were concerned about faculty reactions, particularly whether the faculty would be amenable to being taught by one non-tenured faculty member and one (at that time) graduate student assistant. We were also concerned as to whether the faculty would be willing to complete the considerable amount of work that we had given them both prior to and during the Institute. We also worried about the logistics of collaboration and group dynamics. Would the faculty get along with one another? Would the participating TAs feel too intimidated to say much? Would the participants "buy in" to our beginning assumption that PBL was at least worthy of exploration? Our experience in developing the Institute was thus not unlike that of faculty designing PBL courses, in terms of our initial concerns.

Fortunately for us, the project director knew just about every faculty member who participated, as well as having trained two of the teaching assistants in interactive teaching methods. We knew that these were people committed to teaching excellence; they were also people who used our teaching consultation services, so they were pro-active with their teaching. This gave us a considerable edge. All of them were fully supported by their departments, and all but one was tenured or tenure-equivalent (UCI has an academic appointment known as "Lecturer with Security of Employment." Individuals with this title are members of the Academic Senate even though they are not tenured. Their merit and promotion are based on their teaching skills rather than research.) While they were admittedly sceptical, each participant came into the project with the willingness to consider using PBL. Despite what we thought we knew about the participants, however, we were still surprised by some of the outcomes - pleasant and unpleasant surprises occurred regularly.

The *piece de resistance*, however, was the final day of the Institute when faculty presented posters of their curricula, cases, and assessment plans. (For faculty in the Humanities, conference-style posters were a new experience, so they had to teach themselves how to put one together.) During a reception which the Dean and Associate Dean from the Division of Undergraduate Studies came, attendees visited each poster station and discussed their cases and plans for implementation. The quality of the posters was quite impressive (with one exception) - a testament to the amount of competence, effort, "buy-in", and community responsibility ultimately displayed by our participants.

CONCLUSION

In our efforts to train faculty to use problem-based learning in undergraduate education, we came to several realizations about what is necessary for the successful adoption of PBL. At the very beginning of the Institute, our participants attained the state of readiness most emphasized in the existing literature: they were convinced of PBL's effectiveness in relation to traditional methods, and their learning goals for students were largely in line with those supported by PBL. These initial attributes were not sufficient, however. Other crucial shifts are necessary before faculty can even begin to make the transition to PBL instruction. Changes in practice must be accompanied by underlying shifts in faculty thinking about their

role in the classroom and even epistemological shifts in their understandings of how knowledge is created. Faculty must also be given tools to help them manage logistical challenges germane to PBL, which they may not have encountered previously. Finally, faculty attitudes about student competencies and social responsibility must be addressed (although we had a difficult time actually facilitating any significant changes in this area).

In her discussion of why PBL is a challenge for faculty, Margetson (1991) identifies a false dichotomy between “knowing what” and “knowing how”. She argues that in constructing the notion of expertise in academic disciplines, knowing a lot of content or knowing *about* something is privileged over knowing procedures and practices. Margetson intends this distinction to be used as a lens to view how faculty think about student learning - that faculty emphasize content learning over skill learning - but it is just as useful to think about faculty adoption of PBL in the same way. Many existing efforts to get faculty “on board” with PBL focus on the “knowing what”: knowing about the statistically proven benefits of PBL, knowing about the learning theory behind PBL, etc. In our experience at UC Irvine, we found that the “knowing how” was more important for faculty acceptance - how to align goals with problem design, how to manage logistics, and how to address student characteristics. In the end, however, the true test of our success will come after faculty have actually completed their courses. Stay tuned to next year’s conference.

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