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Leap into...

Problem-based Learning

This publication is aimed primarily at the university teacher who wishes to explore this approach for the first time, but may also be useful to the teacher who has been dabbling in PBL for a while. The object of this publication is to create a relatively simple structure around which you can build your own PBL course.

This publication was originally researched and written by Margaret Kiley, Gerry Mullins, Ray Peterson and Tim Rogers.



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Introduction

Have you ever wondered:

- What is meant by the term "Problem-based learning (or PBL)"?
- How PBL works?
- Why PBLers are such enthusiasts?
- How you could use these ideas in your teaching?
- Whether it is worth the effort?

The approach we've taken is to identify key stages in the PBL process, and then distill a particular approach in the form of action steps within each stage. Our rationale was that books and web sites that offer a large number of choice points for each stage can bewilder rather than help, and that it would be better to offer a whole program that teachers can adapt as they like or as their experience dictates. However, to show the extent of PBL we've provided references to additional resources that may have quite different emphases.

The stages are ordered with a design rather than delivery viewpoint.

Our guiding question was:

"How would I think about designing a PBL course from scratch?"

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What is PBL?

In a nutshell, what is PBL?

The amount of knowledge (in every field) is increasing and the rate at which it is increasing is accelerating. Students cannot learn all the material, but they can learn how to learn the material. This is an important step in helping students become self-directed learners. In problem-based learning students learn to be self-directed, independent and interdependent learners motivated to solve a problem.

In a PBL course students meet together in a small group with a tutor to discuss a set problem. Initially the students explore the problem using their prior knowledge and experience. They then analyse the problem and formulate hypotheses that might explain the problem. They use this information to determine the further information they require to understand and solve the problem.

Students then independently research and gather information that confirms/disconfirms their hypotheses and generates new understandings. These new understandings are presented to the group, which then considers all the information brought in by its members. This may lead to:

- new formulations of the problem
- additional information being added by the tutor
- the identification of questions and information needed to discriminate between competing hypotheses or explanations.

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Throughout this process the tutor acts as a facilitator rather than a teacher. Instead of providing answers the tutor encourages useful lines of questioning and, where necessary, provides some problem solving structure.

Finally the students and tutor assess the quality of the answers they've obtained, as well as the effectiveness of the processes used.

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Why use PBL?

PBL embraces principles of good learning and teaching

Problem-based learning incorporates many of the practices that are now considered the desiderata of good teaching: it is student-directed, fosters intrinsic motivation, promotes active learning and deep learning, often includes peer teaching, taps into students' existing knowledge, encourages reflection on the teaching/learning process, develops collegial learning skills, is conducive to a research-oriented curriculum, involves timely feedback, and can support student self-assessment and peer-assessment.

There is a substantial body of research confirming that having a concrete problem as the focus for knowledge acquisition helps students retain their learning and comprehend it better ([Woods 1994¹](#)). Students are developing knowledge within a context, and also developing skills in deploying their new knowledge. In this way students are garnering transferable skills that are valuable to their life after formal education. If undertaken as part of a group, a well-prepared PBL course will also directly help students develop interpersonal skills they'll be able to draw on for the rest of their lives.

Finally, PBL gives teachers the chance to develop the students they say they want—independent, self-motivated, drawing on a wide range of resources, challenging the parameters of the course and producing interesting work. These are students who aren't just trying to work out what's in the exam, but want to know and learn.

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PBL is consistent with the goals of the University of Adelaide's Learning and Teaching Plan

At the heart of the Learning and Teaching Plan is the goal of promoting greater opportunities for student-centred learning. With student-centred lifelong learning, students actively develop the skills essential for success at university, for employment and for later education obtained either through a formal course of further study or under their own direction.

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Why not use PBL?

The cost

There is certainly a cost to teachers and students in converting to a PBL approach. One indirect cost is the initial shock or 'grieving period' for both staff and students ([Woods 1994¹](#)) as many of the learning and teaching strategies appropriate for the standard lecture and tutorial format are inappropriate in the PBL environment. For staff, moving from expert lecturer to facilitator often proves difficult, and many students report that they are satisfied with the existing surface approaches to learning and can be anxious or even angry about the new PBL approach ([Aldred et al 1997²](#)).

There is also a time cost. Adequate preparation is essential for staff and students ([Woods 1994¹](#), [Aldred 1997²](#), [Barrows 1985³](#)), and even then significant teething problems can be expected ([Ross, Abel, Margetson and Sauer 1985⁴](#)).

Perceptions of direct cost may also have an influence. We say 'perceptions' because a recent investigation of the implementation costs in the Australian context indicated that cost was not a major issue for the study's respondents, with many claiming their change from traditional to PBL format was essentially cost-neutral in terms of direct costs ([Aldred et al 1997²](#)). However, the need for any change involving staff training and the rewriting and piloting of curriculum must necessitate initial outlays, and in an unsympathetic fiscal environment this may be a serious concern.

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Partial loss of control over content

Control over curriculum is also an issue for some. In PBL the teaching staff give greater control over the learning process to students. While a balance always needs to be struck between students' self-directed learning and the department's or profession's learning objectives for the students, the staff will need to feel comfortable with a greater level of unpredictability in learning outcomes.

What PBL is not

PBL is often confused with problem-solving. For example, a traditional didactic lecture or tutorial may require students to apply information provided by the teacher to the solution of a problem in order to show that have understood the theory or in order to demonstrate the applicability of theory to practice. This is an effective teaching technique, but it is not PBL. In a PBL curriculum, the problem comes first. It is in discussion of the problem that students work out what they need to learn.

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Induction

A problem-based learning approach is significantly different from traditional learning approaches. Induction is very important for both staff and students to ensure a successful transition. Converting to PBL challenges core assumptions about learning and teaching and can therefore be quite stressful and stir difficult emotions. Preparation is vital.

Step 1: Get background information

The problem-based learning process

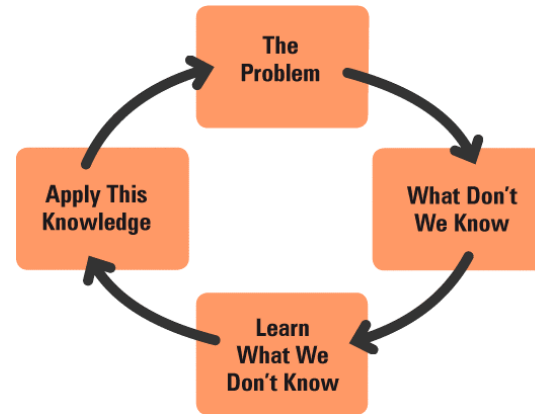
The PBL process can be initially frustrating and even disturbing for students unfamiliar with the approach. Your students will have developed a mental model of the education process from years of exposure to other teaching strategies in high school and probably as an undergraduate as well. With traditional approaches, a problem may be presented for illustrative or practice purposes.

In problem based learning the students start with a problem, identify what they do and don't know, gather information, share the information and apply it to the problem again. This becomes a learning cycle:

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The PBL Cycle



A different focus

The goals and foci of learning in PBL are fundamentally different from those in traditional teaching. No longer is the goal to acquire a specific answer to a predefined problem or to memorise the content matter of the course. Although answers in PBL are important, the learning process itself becomes a focus. Students are learning how they learn, both in general and in their discipline. This means that they need to concentrate not just on knowledge, as they would in traditional subject-based learning, but also on the skills and attitudes required to solve real world problems. Developing group process skills, such as effective listening or coping creatively with conflict, can be viewed as equally important as gains in subject knowledge.

As the learning goals expand, the focus also shifts from a search for solutions to an exploration of framings. How do I perceive this problem, do others in the group share this perception, are there other factors we haven't considered (and so on)? Students begin to ask, for example, how they can best learn about the problem, and how much information they need before they have enough—the sort of questions we all need to ask as independent learners.

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Change in role for learner

In PBL students are encouraged to be active rather than passive learners, and to co-operate rather than compete. They are given greater control over their learning as they move from dependent to independent and interdependent learning.

As students previously measured their success through their command of the 'rules' of subject-based learning, and these no longer apply, the students may feel like they're in a vacuum. How do they measure their success? How do they even know they're on the right track?

Change in role for tutor

The tutor in a PBL course is a facilitator. The tutor encourages the students to explore their own knowledge and determine their own learning needs. The tutor generally refrains from providing information, but instead prompts to generate discussion and learning amongst the students. Tutors do this by:

- clarifying discussion
(e.g. "what are the two different perspectives we are talking about here?")
- suggesting avenues of investigation
(e.g. "are there other possibilities?")
- putting a problem in context
(e.g. "this issue reminds me of another point we raised")
- prioritising issues
(e.g. "could we put these points in order of relevance to the problem?")
- intervening in negative group dynamics
(e.g. "I don't think we're progressing here. Could we stop and examine what's happening in the group?")

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This facilitative role is likely to clash with the students' expectations of effective teaching. They may anticipate a directive approach that provides the necessary information or channels them elsewhere (usually a textbook). A common complaint by students encountering PBL for the first times is that their tutor isn't doing anything.

These changes can result in a sense of powerlessness. One writer, [Woods 1994¹](#), has described the change to PBL and the subsequent loss experienced by students as a 'grieving process'. Students may understandably experience fear and anger, and display resistance to the new learning paradigm. The good news is that if students are aware of this process they can ride out the difficult stages and begin to engage with the PBL approach.

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Step 2: Get tutor training

Experiential learning required

From the foregoing it should be clear that the changes required to move to PBL are not just technical, but involve fundamental shifts in attitude and expectation that can be threatening not just to students, but to the participating staff also.

Like many skills with an experiential component, learning to teach using a PBL approach can be most effectively learnt through first-hand experience. Tutors need to acquire particular facilitation skills. For information on how to go about this at the University of Adelaide contact the CLPD.

Step 3: Prepare your students

Induction for students

It is wise to develop an induction program for students. This can prepare students for some of the potentially distressing aspects of the change in learning approach and maximise their capacity to take full advantage of the rich learning opportunities of PBL.

There are a number of strategies that may assist in this induction phase. These include:

- Outlining the process to explain how PBL is different, the advantages, the likely experiences. Offering the students the same information you have access to in this publication is a helpful first step. They then have a rationale and an explanation for their experiences.

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- Explaining that other students, and indeed tutors, have been through the same difficult adjustment. This can be very reassuring.
- Showing them the problem based learning cycle to give your students an overview.
- Giving a roadmap of the course, including the how and what of assessment can clarify expectations.
- Providing examples of previous groups, either through video, written or oral accounts (or any combination). This can convey the 'flavour' of the process.
- Giving a low-key introduction to the PBL process that will familiarise them with some of the new methods and expectations, and allow them to generate their own knowledge of the kinds of problem solving and group skills they will need to develop is very useful. A simplified problem that can be worked out in class and is fun is ideal. There are a couple of examples on the web of simple problems that you may find suitable for this purpose. See the [The Buffalo Commons Problem](#) or [UBUYACAR](#).

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Developing the problems

The essential aspect of problem-based learning is that you start with a problem, and that this problem drives the learning in the group. By making a problem the fulcrum of the learning experience the students are encouraged to seek only the information they need to resolve the problem. In traditional subject-based teaching students usually encounter a problem when it is used for illustration rather than as a means of applying and developing knowledge. The advantages of PBL are that the students are motivated by the problem to explore their current knowledge and then develop independent learning skills to fill in the missing pieces. These are lifelong learning skills because they are transferable to any number of other learning experiences, both within and without the university. By using PBL and having the problem generate the learning experiences your students will be given greater autonomy in their learning. Careful problem design is needed to ensure that most of the course objectives are met.

Steps in developing a problem

There are typically four steps involved in developing a problem:

- Step 1: Developing Objectives
- Step 2: Formulating Problems
- Step 3: Combining Problems
- Step 4: Providing Resources

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Step 1: Developing objectives

In PBL it is very important to develop course objectives. These objectives will drive problem formulation, student learning goals and assessment.

One standard way of tackling the development of course objectives is to work out what you would like the students to have acquired by the end of the course in terms of knowledge, skills, and attitude.

Knowledge refers to subject content. Specific examples for your discipline might include the design and function of microprocessors, Australian rainforest flora and their classification, or the rites and rituals of Trobriand islanders.

Skills refers to abilities. These will include the obvious skill acquisitions in the applied disciplines, such as administering questionnaires or drilling a cavity, as well as more generic skills such as essay construction, database searching, and seminar presentation.

Attitudes refers to the students orientation to deploying the relevant skills. Examples include a willingness to engage in critical thinking and active listening, and having respect for the opinion of others.

Tip!

Balance is important. Objectives that are very general are hard to assess. If they are overly specific, learning can be constrained.

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Other approaches to developing course objectives include:

Think in terms of the subject or course concepts you are trying to get across. Course concepts are organising ideas that connect different parts of a curriculum. An example from medicine would be 'breathlessness', one from history would be 'revolution'. We can use these concepts to develop the outline of our problems, for example, 'What has caused patient B's breathlessness' or 'Will there be a revolution in Country X'. From this outline you can extract the knowledge, skills and attitudes necessary for resolving the problem.

In a related approach, working backwards from the problem to the objectives is more helpful for some people. In this approach you would think of a professional problem a graduate from your course is likely to encounter, or one you have encountered yourself. What things do you need to know to solve the problem (again, thinking in terms of knowledge, skills and attitudes)?

Ideas for course objectives may also come from existing curriculum documents or from requirements for professional accreditation. Past exam paper questions can be broken down into the course objectives they entail.

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Step 2 Formulating the Problems

Writing PBL problems can be an exacting process, so successful problems are often jealously guarded by their developers. If you can get access to tried and tested problems that dovetail with your objectives then you've saved yourself a good amount of time. More probably you'll need to write your own problems. There are two aspects to this:

- The nature of the PBL problem
- The writing of the problem

The Nature of the Problem (Stepian, Gallagher and Workman 1993⁵, Biggs 1999⁶)

The essential criteria relating to the nature of a problem are:

1. Students need more information than is initially presented to them. Missing information will help them understand what is occurring and help them decide what actions, if any, are required for resolution.
2. There is no right way or fixed formula for conducting the investigation; each problem is unique.
3. The problem changes as information is found.
4. Students make decisions and provide solutions to real-world problems. This means there may be no single "right" answer.

SEE an example of a problem as it was worked through.

Tip!

For inexperienced students start with a common problem. An example in geography could be the rationale for the location of a city; in medicine it could be 'chest pain'; in psychology 'depression'.

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Writing the Problem

The following guidelines will assist in writing a PBL problem:

- Use real world examples wherever possible
- Define major course objectives, beginning with three or four. Use these to provide a focus. Don't go beyond eight to ten. Remember that not all objectives will be investigated to the same depth
- Ensure confidentiality when using real world examples
- Predict the learning issues the students will identify. Do these correspond with the course objectives you are designing the problem to address? Where might the students take the problem, will this be useful, and how would you stop or encourage it?

Step 3: Combining problems

After you have developed one problem you believe will be effective, note the concepts and objectives that have not been included yet. These residual concepts and objectives will act as guides for developing further problems. There will naturally be some redundancy using this process, as some objectives may be included in several problems.

If you find this method difficult then you can try working the other way around. That is, think of problems in professional practice and work backwards to the concepts and objectives until you have a number of problems that in combination will cover all the objectives you have set.

Tip!

Consulting good case writers or trying your problems out with your peers can be helpful.

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Step 4: Providing resources

Once the problems are in place you will need to provide resources for the students and the tutors. The resources for students may take the form of written material, case notes, specialists' reports, in-house experts, guest lecturers, lectures on key issues etc. One of the strengths of PBL is that students are exposed to a variety of resources. Some resources (e.g. discipline databases) can be easily accessed by students. Others may be difficult to access or in high demand and should be 'controlled' in some way, such as a library reserve system. None of the resources should be considered compulsory, as this takes the learning initiative away from the students. The tutors will require tutor briefing notes that detail the problem objectives, how an expert would reason through the problem, which are the important cues and their significance, recommendations about timelines, and a list of resources.

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Developing the problems FAQ

What are the hallmarks of an inadequate problem?

An inadequate problem is one where the students can immediately derive the answer to the problem. At the other end of the scale, the problem may be too abstruse for students at this level, leaving them no idea how to even go about finding the information they need.

How do I think up real-world problems?

For discovering real world problems think of where graduates might find themselves, or draw on your own professional experience. This might mean a professional research problem—a current research problem or lab practical that might be reworked. Past exam papers may be useful as a basis for developing a set of problems that address the core objectives.

Do I want my students to have the course objectives?

You may or may not wish your students to have the problem objectives—having them ensures that the students will take account of them as they formulate the learning issues, and ensures they are clear from the start on the assessable aspects of the course. However, students may close off from fully exploring the problem and pursue the objectives for their own sake. One solution may be to give the students the overall course objectives but not the specific objectives for each problem.

What does a PBL problem do that an essay question doesn't?

A PBL problem looks at applied practice. In doing so it often crosses discipline boundaries - and involves ethical and other issues related to practice. The PBL problem also taps into skills and attitudes, whereas essay questions are typically used for testing knowledge.

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Assessment

As with all curriculum approaches, it is important that the assessment matches the learning goals and the teaching methodology. Students will learn what is assessed, and may ignore non-assessed areas.

The most important function of the assessment process is to enhance student learning. The assessment practices outlined below are designed to provide feedback to the students on their knowledge, skills and attitudes. Armed with accurate feedback both staff and students can work towards continuous improvement.

The key questions to ask are:

- how do I assess course knowledge?
- how do I assess skills?
- how do I assess attitudes?

Steps in assessment

The development of assessment tasks involves three steps:

Step 1: Define objectives

Step 2: Decide on assessment instruments

Step 3: Define criteria and marking system

In reality these steps will overlap, choices in one of them will affect decisions you make in the others.

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Step 1: Define objectives and specify criteria in assessment

Before setting any assessment task, define its objectives. Using the knowledge, skills and attitudes objectives developed at the problem formulation stage, select objectives from each of these categories. You should be able to answer the question: Exactly what aspect(s) of the students' learning do you wish to assess?

Step 2: Decide on assessment instruments

Decide on the method(s) best suited to the objectives and your resources (time involved in examining and marking, facilities and support available).

A variety of methods is desirable to assess a breadth of objectives.

In assessing students in a PBL course the full range of assessment tools may be used—examinations, essays, vivas, Multiple Choice Questions, etc. However, it must be recognised that the more traditional forms of assessment are designed primarily to assess students' knowledge. The goal of PBL is to develop skills (e.g. use of resources, problem analysis and solving, group work skills) and attitudes (e.g. independence, respect for the contribution of others, self-evaluation) as well as knowledge.

To assess the achievement of these goals several less traditional assessment instruments are often used in PBL courses. Three (OSCE, Triple-Jump and Journals) are described in the document [pbl_assessment_instruments.pdf](#)

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Step 3: Define criteria and marking system

Specify the criteria to be tested as well as the standards expected for various grades. Criteria will tell you what specific observable behaviours will demonstrate that the learning objective has been achieved. Different criteria can be chosen to distinguish between grades.

An example from Dentistry:

Criteria and Performance in Dental Education

	Excellent	Good	Satisfactory	Borderline	Unsatisfactory
Examination	The written record shows a comprehensive charting of teeth and shows that all dental tissues and associated structures have been examined closely.	The written record shows a charting of teeth and shows that associated dental tissues and structures have been examined.	The written record shows a charting of teeth with a brief examination elsewhere in the mouth. Periodontal screening only	The written record shows a charting which is sparse, minor conditions such as gingivitis have not been noted.	The written record is largely inadequate. Potentially harmful conditions such as periapical pathology have not been recorded.
History	Medical history has been thoroughly clarified.	An adequate Medical history has been taken.	An adequate Medical history has been taken.	Aspects of the medical history have not been clarified.	The Medical history lacks detail and is not clear.
Patient feedback	The patient's concerns and attitudes are noted.	Most of the patients concerns and attitudes have been noted.	The most significant concerns and attitudes of the patient have been noted.	Little note has been taken of the patients concerns and attitudes.	Significant concerns and attitudes of the patient have not been noted.
Diagnosis & Planning	Accurate diagnosis and ideal treatment planning.	Accurate diagnosis and sound treatment planning.	Accurate diagnosis and acceptable treatment planning.	Diagnosis and treatment planning not ideal.	Diagnosis inaccurate and treatment planning inappropriate for the patient.

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Radiographic examination	A full radiographic examination has been carried out where this is appropriate.	A full radiographic examination has been carried out where this is appropriate.	Appropriate radiographs have been taken to investigate the most significant examination findings only.	Radiographs, if taken, are not fully diagnostic.	Appropriate diagnostic radiographs have not been taken.
Patient consent	The patient has given informed consent.	The patient has given informed consent.	The patient has given informed consent.	The patient has given consent on the basis of information that needs further explanation.	The patient has not given informed consent.
Arrangements	Appropriate recall arrangements have been made, and referrals to other operators.	Appropriate recall arrangements have been made, and referrals to other operators.	Recall arrangements are likely to be adequate. Appropriate referrals have been made.	Little attention has been given to recall arrangements or appropriate referrals.	Recall arrangements and appropriate referrals are absent.

For further details see

Wetherell, J., Mullins, G., and R. Hirsch (1999). Self-assessment in a problem-based learning curricula in dentistry. *Eur J Dent Educ* 3; pp.97-105.

Tip!

After formulating the questions/problems/tasks you will use for assessment, seek feedback from your peers. Then develop model answers that you can use to check the marking system.

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Assessment FAQ

Why are student self and peer assessment often discussed in reference to PBL?

Consistent with the goal of developing independence in students, peer- and self-assessment are often used in PBL to encourage students to take responsibility for their own learning and assessment. Of course this goal is important in any course, so self- and peer-assessment are not necessarily associated with PBL. (For a discussion see Dochy, F, Segers, M & Sluysmans, D (1999) The use of self-, peer- and co-assessment in higher education: A review. *Studies in Higher Education*, 24, 331-350.)

Peer-assessment may involve the PBL group as a whole contributing to the assessment of each member of the group—after all, they know best who did the most valuable work. The books by Woods in the resources section have more on this.

What are formative and summative assessment, and how are they used in PBL?

Formative assessment is the provision of feedback to students that can be used diagnostically by both students and teachers. Summative assessment is a tool for staff to regulate the progression of students through courses. It should represent a valid and reliable sampling of student achievements which leads to a meaningful statement of what they know, understand and can do. Good assessment schemes can, and should, include both formative and summative assessment. In the early stages of a PBL course, formative assessment is particularly useful in helping students tell whether they are on the right track with this new form of learning.

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What are criteria-based and norm-based assessment and which is appropriate for PBL?

If grade determination is criterion referenced the performance of each student is compared with a set of explicit criteria; if norm referenced the student's performance is compared to that of others in the cohort. In PBL, criterion referenced assessment would appear to be the most appropriate as we are interested in whether students have reached certain standards in contrast to who they have outranked. It is important that explicit and widely applicable assessment criteria and standards related to each criterion are established for all assessment tasks.

PBL courses often use non-graded assessment - why?

A non-graded pass system (ie students' work is graded as either 'satisfactory' or 'unsatisfactory' rather than distinction/credit/pass/fail) is often used in PBL to encourage co-operative learning among students. It is argued that the competitive, 'mark-chasing' ethos common in many university classes hinders the problem-solving and co-operative learning processes that are needed in make a PBL group function efficiently.

However, some PBL courses do award grades above 'pass/satisfactory' on the grounds that outstanding achievements should be recognised and as a form of motivation to encourage students to do more than the bare minimum.

There is no definitive evidence on this question.

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Evaluation

Evaluation enables you to see how effective your course has been and how effective you have been in presenting the course. 'Effectiveness' means how well the goals you envisaged for the course were met.

One of the lessons learned about evaluation is *not to try to evaluate too much at one time*. Setting about evaluating every aspect of a PBL course is very daunting, and you may be discouraged from making changes altogether. It is better to evaluate a few carefully selected and manageable aspects of the course.

Types of evaluation

Curriculum evaluation falls into two broad categories (Henry, Hughes & Feletti 1985⁷):

- outcome evaluation looks at the qualities the PBL course engenders in students.
- process evaluation considers what happens during the learning/teaching process and examines the course in its operation.

Outcome evaluation can be a particularly important form of evaluation in PBL because Problem-Based Learning is an innovative approach and questions of cost effectiveness often arise.

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Steps in evaluation

Course evaluation involves four steps:

- Step 1: Select what it is you want to evaluate
- Step 2: Select the most appropriate strategy for the evaluation
- Step 3: Analyse the results
- Step 4: Provide Feedback and propose action

Step 1: Select what it is you want to evaluate

For process evaluation items this depends on what you were aiming to do as a PBL tutor and might involve questions such as:

- did I give my students the room to struggle with the problem by themselves?
- did I prepare the students well-enough for the change?
- did I provide enough/the right kind of resources?

For outcome evaluation the items selected will be suggested by the goals you set for the course. You might want to know:

- did my students acquire the knowledge goals I set for them?
- are they better critical thinkers than when they began?
- are they better at problem solving than my previous students taught by lecture and tutorial?

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An example of a PBL tutor evaluation method

One method we have used successfully in evaluating the tutor in a PBL course mimicked some of the important stages of the PBL process, and so doubled as an example of the process in the life of a professional (in this case the professional being the course evaluator).

Ideally you will need an academic with a learning and teaching background and expertise in PBL. He or she will meet the student group immediately after they have completed the PBL course. Following the format of the first PBL session the evaluator will pose the problem; how do we evaluate this tutor's performance? Specifically, the evaluator begins by outlining the goals of the tutor, and then asks the students; given these goals, what are some of the criteria we should use to measure the tutor's performance? At this point the students may also wish to add to the goals that the tutor has identified. Once the students have brainstormed a number of possible criteria they are prioritised and the evaluator leaves the session with 10 items to build a questionnaire with. The questionnaire will need to be administered the following week by the evaluator

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Step 2: Select the most appropriate strategy for the evaluation

In deciding the best strategy for evaluation, it is important to consider both the sources of information you will draw on and the methods you will use to obtain that information. The following table identifies some possible sources and the kind of information each provides.

Sources of Information for an Evaluation (Newble & Cannon 1995⁸)

Sources	For information on...
Students	Implementation, teaching quality
Graduates	Relevance of course to work
Observers	Descriptions of class process
Professional associations	Comparative data against agreed standard
Employers	Satisfaction with graduate skills
Course materials	Teaching plans, philosophies
Assessment results	Learning outcomes

Tip!

Baseline measures are needed for outcome evaluation. For example, to find out if your graduates have better problem-solving skills in their post-university lives, you will need to know the current problem-solving skill levels of graduates.

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Different methods are available to gather information from these sources. Some of these methods are listed in the table below, together with the aspects of the course each evaluates.

Methods & Techniques for an Evaluation (Newble & Cannon 1995⁸)

Method	Evaluates
Questionnaires	Student, graduate, employer opinion
Interviews	Teaching and/or curriculum
Student's diaries/work records/logs	Learning activities, processes and reactions
Discussion (focus group, panel)	Teaching and/or curriculum
Comments (both solicited and unsolicited)	Teaching and/or curriculum
Observation of student/teacher behaviour	Learning processes, teaching behaviour
'Unobtrusive' observation (eg noting the extent of use of library books)	Student's learning activities
Feedback sections on web pages	Almost all areas of teaching and other facilities
Results of student work	Student learning

Tip!

A rich source of material for evaluation comes from examining the results of your assessment.

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Step 3: Analyse the results

Evaluation results can be explored for issues beyond those immediately apparent. Probing under the surface can often identify useful additional information.

Are female and male students responding differently? What about international students, are there specific issues being identified by them? Are the results different from what you intuitively expected? Might the way the question was asked have been ambiguous? Often talking over the results with someone not actively involved in the activity can put a different perspective on the results.

Step 4: Provide feedback and propose action

The results of the evaluation need to be collated and fed back to the students, along with information on how you or the School will respond. This indicates that you are serious about continual improvement and reinforces the students' belief that their sincere application to the evaluation process has been worthwhile.

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Setting Up

There are a number of considerations when setting up a program to operate in a problem-based format. These include the following:

Timing of sessions

Most traditional teaching/tutorial times are based on the unit of an hour. PBL sessions often need more than an hour. Student directed discussion, exploration of ideas and allowing participation of all group members requires that 1.5–2 hour sessions are timetabled. There will be a natural closure of a session when the students have exhausted their discussion, but students and tutors often feel frustrated if the session is rushed to finish in a 1 hour time slot.

Time to learn between sessions

It is important for students to have time to complete individual research. Therefore there must be adequate time between sessions to allow this individual research to occur, and to allow students to reflect on the information and how it may relate to the PBL case. Allow, at the very least, two days between formal group PBL sessions so that the students can have time to meet, research and integrate their learning.

Briefing tutors for the PBL cases

Each case may have particular emphases, and so it is important for tutors involved in the program to have an appreciation of the case from the perspective of the case writers and the program objectives. This is important in helping tutors facilitate the learning process in the tutorials. Case meetings with tutors need to be planned as part of the teaching program.

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Resourcing the problems

Decisions will need to be made regarding the amount of information you will provide to students. If it is truly student-directed PBL, students should be encouraged to seek out information that will address the case, rather than have you provide it. However, if the information is not readily available, you may need to provide paper-based or web-based information for the students. If you provide everything, students will not become self-directed independent learners.

Preparing the students

Some students may be resistant to working in a PBL format. Students used to and who prefer a more didactic approach to learning will find PBL more challenging. If students are unaccustomed to working in small groups and in a problem-based approach, some time may need to be devoted to providing information and assistance to make the change to work in a problem-based approach. Strategies to achieve this are discussed in the section on induction beginning on page 13.

Group size

Ideally, groups should be less than 10. Eight is probably ideal. This ensures that students can easily participate and engage in the learning process. This group size is not feasible in some schools, so various methods have been used to accommodate the need for smaller groups. In some places, a tutor is responsible for 16-20 students, but has the group divided into two groups of 8-10. Each group works independently of the other, with the tutor moving between each group. This is less than ideal, but at least allows the students to work in smaller groups.

Some other schools have students working without a tutor. In this case, a student leader may report back to a meeting with other leaders between sessions.

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If you need to have students working without a tutor, some time should be invested in developing students' skills to work in a small group. Don't assume they have these skills, as many students cannot work effectively long term in a small group setting.

Thinking about your assessment

If the change in the teaching approach is not reflected in the assessment, students will quickly pick up what is important—assessment does drive student learning. Be quite clear during the setting up period with students about the assessment process.

Attendance at PBL sessions

PBL tutorials rely heavily on student participation in the learning process. You will need to make a decision about attendance at PBL tutorials. What is the minimum attendance requirement without reasons (ie medical/compassionate). Is it 90% attendance sufficient, or is it necessary to attend all sessions? What happens if students don't meet this requirement?

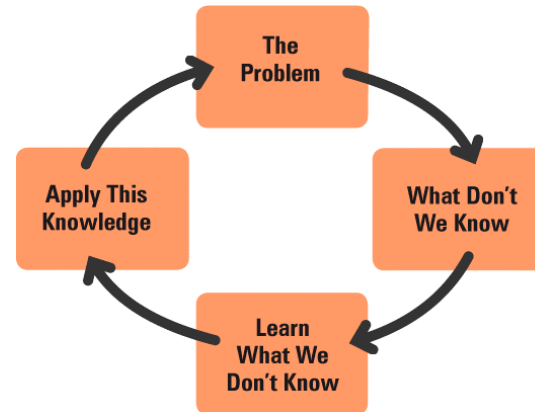
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First Meeting

The first PBL meeting introduces the students to the problem and the problem-based learning cycle. Even though the students would have been exposed to the cycle during the induction phase, present it to them again now. Explain that, just as in their practice problem during induction, you will be there to prompt, to offer help and suggest questions they might like to explore, but that your role is a facilitative one only. They (the students) are in charge of their learning.

The PBL Cycle



Steps in the first meeting

The first meeting with students will involve three steps:

- Step 1: Present the problem
- Step 2: Generate objectives
- Step 3: Organise the group

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Step 1: Present the problem

The first PBL session starts with the presentation of the problem you have developed. This may be in video, audio or written format. Having had some practice in the induction process with a dummy problem the students and the tutor will be somewhat comfortable with the stages of the process.

These are:

- The students attempt to broadly identify the problem and its key factors. Using their own experience and existing knowledge they generate a number of potential causes, mechanisms and solutions. Brainstorming of one sort or another and recording the results can be helpful in these early stages for creating a picture of the group's collective understanding of the issues;
- The tutor ends this phase by encouraging the students to critically examine their preliminary suggestions. At the end of this step the students should have a clear picture of what they know, what they don't know and what kinds of knowledge are required to fill the gap.

Step 2: Generate objectives

Once the problem has been set and the students have generated a number of learning issues, these can then be converted into learning objectives for the problem. The tutor facilitates this process and can validate the students' choices. Aim for 4 to 6 objectives to be generated. If some major objectives (which were determined by you in the problem formulation stage) have not been generated through this process then you can suggest these and give the rationale for their inclusion.

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Step 3: Organise the group

Unlike the traditional content-based curriculum, in PBL the students organise themselves. The learning goals, once identified, are shared out. Each student takes on a task. The students then individually use the available resources to develop an understanding of the information, which they can then bring back to the group for the second session.

The resources can be anything that illuminates the issue under investigation. They can be written materials made available in the library by the tutor, a lecture they request from the tutor, web-based resources, experts in the field and so on. There are two cardinal rules for this investigative stage:

- The object for each student is to get information and develop understandings relevant to the problem as defined by the class. Trawling for masses of information will not be helpful.
- The second point is closely related to the first. The information is gathered with one eye towards the presentation of that information to the class. The information must be both relevant and understandable.

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First Meeting FAQ

Should the students appoint a chairperson for each meeting?

Before deciding to have a chairperson you need to decide why you want a chairperson. Not having a chairperson can have its advantages as students tend to work more collaboratively and share responsibility within the group.

If a chairperson is needed to take on some management responsibility within the group, these responsibilities need to be defined. Some chairpersons can become quite directive and didactic rather than facilitative of the learning process.

The students are going down the wrong track. When do I intervene?

Students need to go down the wrong track as this is part of the information sorting process.

When to intervene is always the tutor's dilemma. Tutors need to be conscious of the time, but not to close off the discussion too early. Often wrong track discussions will naturally finish as students will run out of ideas to extend the discussion. This is good cue to move on!

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What if the students have not picked up the objectives I hoped they would?

If the case is well written and based around objectives students will generally cover all the core objectives. Often student learning goes beyond the intended objectives for the case. Reviews of cases completed by 10+ groups indicate that there is considerable commonality in the objectives covered

If students are not picking up on a particular area, the skill of the tutor is important here. Without telling the students, the tutor may have to use some creative questioning to get students to focus on particular aspects. If this doesn't get the students attention then wait until the next session and see how the learning unfolds—all groups move at different rates and this needs to be considered.

How many meetings should be allocated for each problem?

This decision should be made as part of the program plan. Whether students are to meet for 3 or 4 sessions, or weekly for a whole semester must be decided before the problem starts. Students may meet informally outside this time, but that is a decision they can make and need not include the tutor.

How do I deal with non-participants?

Non participation can indicate a degree of comfort (or lack of) within the group. Give individuals time to settle into the group before becoming too judgmental.

Not everyone is a constant contributor in sessions. Some students actually make smaller but far more effective contributions when they do participate.

Long term non participation is an issue. It needs to be discussed within the group to get it sorted! Both the group and the student have a responsibility to overcome this situation.

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How do I deal with anxious students?

This is an area of concern particularly when students are beginning in a PBL format. You do have a role in giving students feedback on how PBL works, so that they can at least feel as if they are doing things the right way. Students gradually learn to manage the uncertainty in the learning process as they take control of their learning. For some students, this can take some time.

How do I deal with angry students?

Students generally won't be angry but they will be frustrated. These are often the students who don't want to have responsibility for their own learning, or find it difficult to know what to learn. For those that don't want to take control of their learning it is important to reiterate that this is part of the process of them becoming independent and self-directed learners. These should also be objectives of the program.

For those students frustrated because they don't know how to learn, it is important for the tutor to give some guidance on how students can go about the learning between sessions. This can be a group discussion: How will we find out this information?

How do I answer the question "how much of this is assessed?"

This is a good question and students will want to know the answer. Are students going to be assessed through the tutorials? Will attendance be necessary? Part of the program planning will require that this be sorted out.

What role will the tutors have in the assessment? What objectives can be assessed through the tutorial process? What weighting will be given to this part of the program? These decisions need to be made.

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How do I answer the question "why don't you give us the answer?"

Students will ask the question early in their development and use of a PBL approach. It needs to be clarified with students that the tutor's role is not to give answers but to guide their learning. Students need to recognise that they need to understand the ideas and active learning is more likely if they grapple with and solve their learning problems. Don't give into the pressure to give the answer!

In some cases when students ask this question it means they have reached the limit of their knowledge. Instead of giving them the answer, ask them what they need to now research to help them find out the answer.

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Further Meetings

The students have now met once, discussed the problem, developed learning objectives (in the first class) and individually gathered and summarised material (in-between classes). The following suggests how the second, third and final meetings could be organised.

Conducting the second and subsequent meetings:

Second meeting: Share and evaluate information

Third meeting: Consolidation

Final meeting(s): Generalisation, feedback and evaluation

Second meeting: The students share and evaluate the information

In the second PBL session the students share the information they have gathered and the understandings they have developed since the first session. Sharing the information means that students must not only acquire the information but must organise it in a way that the others in their group can understand its relevance to the problem. After discussing the implications of this new information the students can refine their early conjectures and uncover their knowledge gaps. In this way the cycle continues from the start as the students close in on more refined definitions of the problem and discover more pertinent information for resolving it. The goal for the students should be to synthesise all the information by applying it to the problem. As with the first meeting, they then decide on the learning goals, who will investigate which goal, and when they will meet again.

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Tip!

Concept maps or similar techniques can help to ease students into the skills of presentation.

A third meeting to consolidate

In the third meeting the students proceed as they did in the previous session. Following this they should distill the information they have gathered and presented up to that point, using questions such as:

- What are the key issues as they are defined them in their final form?
- How has this developed from their initial hypotheses?

This helps your students to reflect on their learning and the stages they have been through. This meta-learning is valuable in its own right, but importantly it will also give the students confidence in facing their next PBL problem as they will have experienced some of the learning impediments and serendipities they encounter when dealing with real world problems.

Final meeting: Generalisation, Feedback and Evaluation

The purpose of the final meeting is to reflect on and evaluate their learning. This can be achieved through three major processes.

Generalisation

One of the benefits of PBL is that students develop knowledge and insights that span a range of issues (problems), as well as developing skills that can be applied to any problem. You can help them to realise this by asking them to suggest (and suggesting yourself) other problems that they could solve based on their solution of the problem they have just worked on.

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Feedback

Provide an opportunity for two-way feedback; tutor to students and students to tutor. Describe the things you think worked well and those that could be better next time. These can be incorporated into the learning objectives for this group with their next problem. Students should have an opportunity to say what went well for them and what didn't.

Evaluation

Feedback comments are very useful evaluation data and often enable relatively immediate responses to difficulties and shortcomings. Allow time for other evaluation measures if required.

Tip!

Student feedback can be written on a whiteboard. If any patterns develop around the things that didn't work they can be explored as problems using some of the skills the students have been developing (identifying the problem, generating hypotheses, identifying resources and so on).

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Further meetings FAQ

The students are still (or for the first time) digressing from my course objectives. Can I introduce further material at this point that re-directs them?

The tutor will need to make a decision on this knowing the plans for the case. It can be useful to provide some information which will help get them back on track. For example, 'What if I tell you that occurs? How does this influence your thinking?

Key snippets of information like this can be quite useful in getting students back on track

What is progressive disclosure in PBL?

The structure of PBL problems can vary. In some courses (eg architecture, engineering) the problem can be given all in one package at the start. Students have all of the information and then proceed on their learning to meet the case objectives, sometimes over a period of weeks.

An alternative approach is structure a problem so that students get additional information as they work through the problem. Often this helps narrow the focus of the learning, as students have acquired more of the general information at the beginning. To write these problems you really need to think about the problem from the student perspective. What they may have learned at each stage in the problem, and what additional information will help them. Progressive disclosure has been used successfully in the health sciences as cases often unfold around a patient case.

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Web resources

The Samford PBL Initiative

<http://www.samford.edu/pbl/index.html>

A superb site. Extensive, exhaustive, and easy to navigate. Contains valuable search engines, a number of articles by practitioners, a PDF newsletter and a thorough explanation of, and rationale for, PBL.

The University of Delaware PBL site

<http://www.udel.edu/pbl/problems/>

A very useful source of articles and sample problems, especially for the sciences.

The PBL Initiative of Southern Illinois University Medical School

<http://www.pbli.org/core.htm>

An overview of PBL, particularly but not exclusively relevant to medical education, by the authoritative Howard Barrows. Well worth a look.

The Center for Instructional Support's PBL checklist

<http://www.uchsc.edu/CIS/PBLChkList.html>

A useful checklist for the novice PBL teacher, covering preparation, introducing students to PBL and process issues.

The University of Brighton's PBL Directory

<http://interact.bton.ac.uk/pbl/index.php>

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Queens University Medical School

<http://meds.queensu.ca/medicine/pbl/pblhome.htm#contents>

A PBL book on-line, excellent as a primer for applying PBL in the health sciences.

Maricopa Center for Learning & Instruction's PBL site

<http://www.mcli.dist.maricopa.edu/pbl/problem.html>

Contains the UBUYACAR problem for mathematics "that involves using the Internet to research the problem underlying an automobile purchase. We provide online student and instructor/tutor guides that can be printed in full format from Acrobat files. Our format may be readily adapted to other subjects." I haven't used it, but it sounds intriguing.

The Buffalo Commons Problem

<http://www2.imsa.edu/programs/pbln/problems/#buffalo>

An interactive Problem-based Learning experience brought to us by the Illinois Mathematics and Science Academy's Center for Problem-Based Learning. A good novice's problem and a good application of the web to PBL.

Investigating PBL: A Webquest

http://edweb.sdsu.edu/clrit/PBL_WebQuest.html

San Diego State University hosts this introductory web book on PBL. Useful for an overview.

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Printed resources

We start with the very detailed and justly celebrated trilogy by Woods. These three books, which are cross-referenced, describe in detail nearly every aspect of implementing a PBL course. Very readable, full of ideas, user friendly; obviously the work of an enthusiast.

Woods, Donald R. *Problem-based learning: helping your students gain the most from PBL: instructor's guide to Problem-based learning: how to gain the most from PBL*. 2nd ed. Waterdown, Ont.: D.R. Woods, 1998, c1995.
BSL Main Collection 378.179 W894p Suppl.

Woods, Donald R. *Problem-based learning: how to gain the most from PBL*. Waterdown, Ont.: D.R. Woods, 1994.
BSL Main Collection 378.179 W894p

Woods, Donald R. *Problem-based learning: resources to gain the most from PBL*. 2nd ed. Waterdown, Ont.: D.R. Woods, c1997.
BSL Main Collection 378.179 W894pr

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Barrows, Howard S. *How to design a problem-based curriculum for the preclinical years*. New York: Springer Pub. Co., c1985

BSL Main Collection 610.711 B278h

A helpful overview of design, obviously oriented to a medical pbl curriculum.

Boud, David and Grahame Felletti (eds) *The challenge of problem based learning*. London: Kogan Page, c1991.

BSL Main Collection 378.179 B756c

Boud, David and Grahame Felletti (eds) *The challenge of problem based learning*. 2nd ed. London: Kogan Page, 1997.

BSL Main Collection 378.179 B756c.2

Roseworthy Books 378.013 1

Mixed in terms of quality but covers a wide range of topics in PBL and uses in different subject areas. Also has some interesting material on aspects of teaching - curriculum design, small group teaching etc.

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1. Woods, D. (1994). *Problem-based learning: how to gain the most from PBL*. D.R. Woods; Waterdown, Ont.
2. Aldred, S. et al. (1997). *The direct and indirect costs of implementing problem-based learning into traditional professional courses within universities*. Department of Employment, Education, Training and Youth Affairs; Canberra.
3. Barrows, H. (1985). *How to design a problem-based curriculum for the preclinical years*. Springer Pub. Co.; New York.
4. Ross, B., Abel, D., Margetson, D. and Sauer, C. (1985). Designing academic programmes with a problem orientation in Boud, D. (ed.). *Problem-based Learning in education for the professions*. HERDSA; Sydney.
5. Stepien, W.J., Gallagher, S.A., & Workman, D. (1993). Problem-based learning for traditional and interdisciplinary classrooms. *Journal for the Education of the Gifted*, (4), pp. 338-345. on <http://www.cotf.edu/ete/teacher/tprob/teacherout.html>
6. Biggs, J. (1999). *Teaching for Quality learning at university: What the student does*. SRHE Open University Press; Buckingham

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7. Henry, R., Hughes, J., and Feletti, G. (1985). A problem-based approach to monitoring evaluation in Boud, D. (ed.). *Problem-based Learning in education for the professions*. HERDSA; Sydney.
8. adapted from Newble, D., and Cannon, R. (1995). *A handbook for teachers in universities and colleges: A guide to improving teaching methods* (3rd ed.) Kogan and Page; London.

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Example of Development of a 'Problem'

On this page one of us with no experience teaching in a PBL format worked on developing a PBL problem in psychology, aimed at 2nd/3rd year educational psychology students. The subject was an introduction to the psychology of reading. Psychology was chosen because it offered a chance to try and develop a problem in an academic area that doesn't normally use a PBL approach. It would have been easier, for example, to present a PBL problem from the Health Sciences, in which there are many examples to choose from both on this campus and the web.

The PBL problem was designed to be presented at the end (in the last five weeks) of the normal course, as a tentative and experimental step towards, perhaps, implementing a full-blown PBL course in the future.

Putting as much together as possible, one of us (the 'site guinea pig') then took the material to a couple of experienced PBL practitioners for comment. The idea of the following page is twofold:

- it offers examples of objectives, problems, assessments & evaluations
- it describes the iterative development of the problem.

The original formulation of the problem appears first, followed by the critique of each facet of the design and our reflections on redesigning, followed by an attempt at redesign. Each step, therefore, has successive versions, and the reasoning that led to the revision. We're hoping this is useful, rather than confusing, as it documents some of the tensions and difficulties of converting to a PBL approach. However, if you just wish to look at the finished version of the problem on its own we have it here. One word of caution. This problem has not been tried out, so we can't vouch for its effectiveness. The following is intended for illustration only.

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Rationale

The rationale for the following problem was to select something that was controversial, had an interesting history, was practical. and would therefore interest students studying educational psychology. Being controversial meant that there would be competing views, and that meant that students would have to sort out the 'wheat from the chaff' and maintain an openness to new evidence that might undermine the views they held. The idea wasn't to solve the problem once and for all. The important thing for the students was to understand the attitudes of tentativeness and scepticism that psychologists must bring to all data, and the need to accommodate the views of other professional and representative groups.

Comments

"When are your students going to hear this rationale, before or after they are introduced to the problem?", our PBL experts asked. My initial reaction was that they would hear about it in the course feedback phase, so that they weren't constrained in their investigations by what they think I want to hear, and, consequently, could then experience their natural reactions and ways of dealing with these kinds of problems. That would be a powerful learning experience for them, I thought. For example, if they habitually polarise around opinions rather than try to get at the best data, they have a built-in impediment to thinking like a psychologist is supposed to. The problem with this approach is that they could spend the whole case not learning how to think like psychologists. Our PBL experts' compromise was to make sure the rationale was included in the tutors' notes so that the tutors could flag it when they saw the students stuck on opinions or ideology, and suggest that psychologists have particular ways of dealing with these disputes that they could try. I hadn't even thought about the tutors' notes to that point.

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Course Objectives

Attitudes: openness to new and conflicting data; critical of all data.
Skills: exhausting evidence from each source; search for crucial evidence that might distinguish one position from another; understanding the format of published psychology papers. Groupwork skills: exploring views that contradict one's own—listening, questioning, stating one's own position.
Knowledge: experimental design; basic statistical understanding; overview of psychology of reading literature.

Comments

I would give the students these general objectives. This would enable them to get an initial idea about the topics they would be assessed on. The more specific learning objectives for each stage of the PBL process would be for the tutor's eyes only, in their briefing notes.

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<p>Problem</p> <p>You are a psychologist working for the Education Department. The Department is developing a position paper on the optimum strategy for lifting literacy levels. There is concern that these levels have dropped in the last 30 years and continue to do so.</p>
<p>Comments</p> <p>The big problem I kept coming up against was how much I could influence the direction of the students. I didn't want this to be a pseudo exercise where I pretended to give them free rein to develop a strategy but in reality knew exactly what they should do and find, and if they found anything else that would somehow be "wrong". On the other hand, I didn't want them wandering too far away from the knowledge I was trying to introduce them to. After all, if they decided that the problem was entirely political I don't think they would get much of a chance to engage in the kind of thinking that enables them to discriminate between alternative accounts, or the knowledge of the history of the debate that would inform their expertise as practising psychologists. Our PBL experts' suggestion was to include these clues in a story that surrounds the problem. It also became apparent that the level of sophistication of the students was an important factor in deciding how much or little guidance to give. It was also important to keep in mind that the students should be given as much choice as they can handle in determining when they had enough data, including the fostering of debates on just such an issue if it arose. My friendly oracles also suggested that I keep the course objectives above in mind as I write the story.</p> <p>Problem rewritten as a Story</p> <p>You are a psychologist working for the Education Department. The Department is developing a position paper on the optimum strategy for lifting literacy levels. There is concern that these levels have dropped in the last 20 years and continue to do so.</p> <p>The Department is under pressure on several fronts. The Federal Government is planning on tying funding to a demonstrable increase in literacy levels.</p>

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The Teachers' Union denies that the objective data indicates a decline in literacy levels and, at any rate, an overly tight focus on literacy will mean ignoring vital aspects of children's social learning.

Meanwhile a Parents' Association has petitioned the State Government for a return to a phonics based reading program, claiming the whole word or 'show and tell' method used widely is not working and is responsible for the alleged drop in literacy levels.

Expected Learning Issues

I originally didn't have this section, but was assured that this is a good way to think about the problem. In effect, I'm asking "where the students might take this question, and does it match my objectives?"

1. Is there a literacy problem?
2. What is the basis of the Government's argument?
3. What is the funding issue?
4. Why do the teachers have a different position on the data?
5. What is the 'social learning' the teachers claim the students will miss out on? Will they?
6. What is the phonics approach and what is the whole word approach?
7. Do the teachers use the whole word approach?
8. Is there evidence that one is superior to the other?

Comments

The next suggestion of our experts was to consider taking out the information in the last paragraph above, outlining the Parents Association's concerns about the effects of teaching strategy on literacy, and introducing it later. This would allow the students to focus on the first 5 points above until sometime into the second session. At the tutor's discretion, after the students have exhausted the material, this can be brought in, as a late development in the situation they need to take into account. This is an example of 'progressive disclosure'. One of the benefits is that this will give me greater control over how fast the students reach closure on the problem.

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Title
Whole word vs phonics
Comments
Reading the problem makes it clear why the title 'Whole word vs Phonics' is presumptuous. The first issue is whether there has been any fall in literacy levels. I made this original error because, I think, I was concerned that my knowledge based course objectives were not going to be met.
Title, 2nd attempt
Literacy in decline?

Resources
Data on literacy levels a) Federal Government interpretation b) Teachers' interpretation
Whole word vs. phonics psych literature annotated bibliography
Requirements of national guidelines from Federal Government
Any other materials the students feel they require
Comments
The trick here, I was told, was not to get too hung up on the material. If any resource is scarce or difficult to find, then by all means place it on the library's reserve system or otherwise control access.
The real issue is to have the tutor(s) engage the students in a dialogue in which they explore the knowledge already held in the group, including the knowledge about where to go for the information they don't currently have.

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Tutor notes

Rationale from above, to guide the tutor's actions.

Session 1 learning goals

To dissect the problem. How many aspects are there? Students should come up with most of these (the funding issue is least vital):

1. Is there a literacy problem?
2. What is the basis of the Government's argument?
3. What is the funding issue?
4. Why do the teachers have a different position on the data?
5. What is the 'social learning' the teachers claim the students will miss out on? Will they?

Conversation starters

Students may need encouragement to stay with identifying the problem in all its aspects. Examples of starters are:

"What do you think the problem is?"

"Do all the protagonists see the same problem? If not, what are the problems they each see?"

"Is there more than one problem here?"

Planning ahead

To understand the data on literacy levels and the studies on Whole Word vs. Phonics in the resource list the students will need to have an understanding of the role of statistics in adjudicating such issues.

Session 2 learning goals

1. Explain the discrepancy between the figures used by the teachers and the Federal Government.
2. Explain and evaluate the teachers' concern that the focus on literacy levels is misleading.

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When the students have covered the material and reached closure then the second part of the problem (which brings up the Parents' concerns) can be presented and the following issues should be identified:

6. What is the phonics approach and what is the whole word approach?
7. Do the teachers use the whole word approach?
8. Is there evidence that one is superior to the other?

Session 3 learning goals

Have to bring it all together—time is limited for a professional psychologist. Writing of report for Minister (only need to design content, not write finished document).

Students should bring all relevant aspects to the report:

1. Is there a literacy problem?
2. If there is, is there a danger of focussing too heavily on it?
3. Does the whole word and phonics debate have any impact on literacy?
4. What don't we know that we'd need to know to progress rationally, according to the standards of experimental psychology?

Assessment

Formative assessment of groupwork skills through intervention by tutor on-line to encourage reflection, this being recorded in a journal. Twice meeting with tutor to discuss the journal. This has a reasonable weighting so that it is taken seriously.

Summative assessment of groupwork skills through take-home exam based on a presentation of a video (available on-line) of interaction in a problem-based group. Questions include "Name four follow-up open questions Person B could have asked to keep the conversation going" and similar questions aimed at assessing Person B's performance. These questions are designed to introduce the students to the skills they'll need to self-assess, which I hope to introduce later in the program.

There will also be a Multiple Choice Exam with short problems followed by questions that aim to get at both knowledge and attitudes. Each problem is progressively revealed a number of times, each time with a set of MCQs following.

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Attitude questions include "On the data presented so far, can you reach a final conclusion?" with the choices ranging from "need more data" to "need specific data on x". Many of the answers are partially right and get partial marks, and as the problem is developed through the paper the students can use the further information to go back and change their answers if they feel they need to. Knowledge questions refer to specific statistical tests and their interpretation, and a section of questions specifically on the issue of phonics, whole word and literacy.

Comments

At this point I became acutely aware of how synchronised the teaching team would have to be. For example, all the tutors would have to be role modelling 'open questions' and my induction phase would have to include specific instruction on this for the students and tutors.

I could also see that as I was working out my assessment I was refining the criteria for my objectives. For example, the knowledge objective "Openness to new and conflicting data" and the skill objective "exploring views that contradict one's own" required that I define how I would know when students are demonstrating those skills, and therefore how they could be assessed on them. In this case, learning when and how to ask open questions was one part of the equation. Once these are refined I can include them in the overall course objectives I give the students, and they can determine how much help they need learning them.

But how do students acquire these attitudes, skills and knowledge when all they are doing formally is working on the problem? Once again, the tutors need to flag the occasions where the students are in need of the skills, attitudes and knowledge that will help them manage the problem. They will need to have ample opportunity to engage in formative assessment of these course objectives.

The upshot was that my assessment strategy was grandiose: it was premature to introduce major summative assessment after only an induction period and 3 sessions. The students would need to 'bed down' the process for the full length of a course at least.

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My alternative this time around is to offer a smaller version of the multiple choice exam, but make it worth only 5% of the overall mark for the course, with another 10% for a committed attendance to the sessions and student meetings scheduled in between. All the rest would fall on the earlier stages of the course, still taught traditionally.

Feedback session

Review what was learnt; explore generalisations of skills learnt. Feedback on what went well, what didn't and how it could be better.

Comments

Here I could focus much more on how well the objectives were learnt, and therefore how well the students are likely to fare in assessment. I could use observations of specific moments in the case to illustrate where (and why) I think improvement is needed.

Evaluation

I'll use an outside evaluator.

Resources

For a good (but dated) overview of the key issues and history of the 'whole word' vs phonics debate:

Crowder, R.G. (1982). *The Psychology of reading*. Oxford University Press. New York.

An excellent article on the critical thinking skills valuable to psychology students at different stages in the curriculum:

Halonen, Jane S. (1995) Demystifying Critical Thinking. *Teaching of Psychology*, 22, 1: 75-81.

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The developed 'Problem', rewritten without comments

Rationale

The rationale for the following problem was to select something that was controversial, had an interesting history, was practical, and would therefore interest students studying educational psychology. Being controversial meant that there would be competing views, and that meant that students would have to sort out the 'wheat from the chaff' and maintain an openness to new evidence that might undermine the views they held. The idea wasn't to solve the problem once and for all. The important thing for the students was to understand the attitudes of tentativeness and scepticism that psychologists must bring to all data, and the need to accommodate the views of other professional and representative groups.

Course Objectives

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Skills: exhausting evidence from each source; search for crucial evidence that might distinguish one position from another; understanding the format of published psychology papers. Groupwork skills: exploring views that contradict one's own—listening, questioning, stating one's own position.

Knowledge: experimental design; basic statistical understanding; overview of psychology of reading literature.

Problem Title

Literacy in decline?

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Problem

Part 1

You are a psychologist working for the Education Department. The Department is developing a position paper on the optimum strategy for lifting literacy levels. There is concern that these levels have dropped in the last 20 years and continue to do so.

The Department is under pressure on several fronts. The Federal Government is planning on tying funding to a demonstrable increase in literacy levels.

The Teachers' Union denies that the objective data indicates a decline in literacy levels and, at any rate, an overly tight focus on literacy will mean ignoring vital aspects of children's social learning.

Part 2

Meanwhile a Parents' Association has petitioned the State Government for a return to a phonics based reading program, claiming the whole word or 'show and tell' method used widely is not working and is responsible for the alleged drop in literacy levels.

Expected Learning Issues

Where might the students take this question?

1. Is there a literacy problem?
2. What is the basis of the Government's argument?
3. What is the funding issue?
4. Why do the teachers have a different position on the data?
5. What is the 'social learning' the teachers claim the students will miss out on? Will they?
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Resources

Data on literacy levels

- a) Federal Government interpretation
- b) Teachers' interpretation

Whole word vs. phonics psych literature annotated bibliography

Requirements of national guidelines from Federal Government

Any other materials the students feel they require.

Tutor notes

Rationale from above, to guide the tutor's actions.

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Planning ahead

To understand the data on literacy levels and the studies on Whole Word vs. Phonics in the resource list the students will need to have an understanding of the role of statistics in adjudicating such issues.

Session 2 learning goals

1. Explain the discrepancy between the figures used by the teachers and the Federal Government.
2. Explain and evaluate the teachers' concern that the focus on literacy levels is misleading.

When the students have covered the material and reached closure then the second part of the problem (which brings up the Parents' concerns) can be presented and the following issues should be identified:

6. What is the phonics approach and what is the whole word approach?
7. Do the teachers use the whole word approach?
8. Is there evidence that one is superior to the other?

Session 3 learning goals

Have to bring it all together—time is limited for a professional psychologist. Writing of report for Minister (only need to design content, not write finished document). Students should bring all relevant aspects to the report:

1. Is there a literacy problem?
2. If there is, is there a danger of focussing too heavily on it?
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Assessment

A Multiple Choice Exam with a short problems followed by questions that aim to get at both knowledge and attitudes. The problem is progressively revealed a number of times, each time with a set of MCQs following. Attitude questions include "On the data presented so far, can you reach a final conclusion?" with the choices ranging from "need more data" to "need specific data on x". Many of the answers are partially right and get partial marks, and as the problem is developed through the paper the students can use the further information to go back and change their answers if they feel they need to. Knowledge questions refer to specific statistical tests and their interpretation, and a section of questions specifically on the issue of phonics, whole word and literacy.

Feedback session

Review what was learnt; explore generalisations of skills learnt. Feedback on what went well, what didn't and how it could be better, with a particular emphasis on the course objectives and where the students did and didn't display the attitudes, skills and knowledge they need to develop.

Evaluation

Using an outside evaluator (see evaluations examples page).

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Problem-based Learning

This publication was researched and written by
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