PROBLEM BASED LEARNING:

Rationale and Guide to Participants

(Extracted and edited from “A Guide for Facilitators in Problem-Based Learning in the Edinburgh MBChB Programme”, by Phillip Evans)

WHY PROBLEM BASED LEARNING?

Problem based learning (PBL) is a general term used to describe an approach to learning in which a small group of students come together in a series of meetings to work through a case or problem. In Edinburgh, the method is most commonly used in the teaching of medical students. The College of Medicine and Veterinary Medicine have settled on the term “problem-based learning” (PBL) to emphasise that the students are given a paper-based case. A “Facilitator” is normally present, not as an expert to be consulted about the factual content of the problem itself, but rather to support the students' thinking process and the structure of the discussion.

PBL also helps to develop generic and transferable skills. The reasoning is that adults learn best in small groups or teams that are united by a common task or problem. Professional people often work together in groups or teams and it is well known that progress is seriously impeded when such groups are dysfunctional. Thus, providing undergraduates with an opportunity to engage in group-based PBL helps to develop the skills needed to recognize and overcome difficulties that may arise in team working in their subsequent professional life.

SELF-DIRECTED LEARNING

The principles associated with problem based learning are:

- Learning through curiosity, exploration of knowledge and the critical evaluation of evidence should promote and ensure a capacity for self-education;

- There should be emphasis throughout the course on communication skills.

The capacity for self-education requires a number of skills; the most crucial being the ability to be reflective and discriminatory about what has to be learnt in order to progress from "ignorance" to "mastery" which is the essence of problem based learning. Individuals working together in a group must constantly discuss abstract ideas and, more important, learn to accommodate the inter-personal dynamics generated by the various personalities in the group.

THE ROLE OF THE FACILITATOR

The facilitative style is the most appropriate approach for a problem-based tutorial. The Facilitator (tutor) sits with the group and maintains a state of “passive control” where the dominant activity is listening and monitoring the students’ discussion. The Facilitator will be mindful that the students are engaged in a complex form of learning that involves them exploring academic issues and participating in a process of
psycho-social interactions.

The Facilitator will do the following things:
- guide the process by supporting the chair, the scribe and the collaborators.
- encourage positive dialogue
- suggest strategies, structures and pathways that enables comprehension of complex, factual scenarios
- foster an atmosphere in which the individuals feel confident about collaborative learning

The Facilitator will avoid:
- reporting factual information, or engage in formal didactic teaching.
- saying too much.

**THE PROBLEM BASED LEARNING SEQUENCE.**

The group will be heterogeneous to encourage open-mindedness. The PBL sequence is composed of a series of two meetings, each lasting about ninety minutes, interspersed with individual study time. The meeting has a formal structure (sometimes written out as an agenda) which should be understood by students and enforced by the Facilitator. The steps are:

1. The group meets. Members introduce themselves (if appropriate), they select a new chair and scribe at each meeting.
2. Starting with the scenario/case/abstracts, the group identifies any terms that are not clear.
3. Define the topic and consider the main components.
4. Brainstorm the breadth and depth, as far as possible.
5. Analyse the information from the brainstorm, agree and prioritise the learning points and draw up a list of learning objectives and consider resources. The meeting ends.
6. Working independently the members research and learn in their own time.
7. At the next meeting, revisit the scenario and discuss the recent learning.
8. Revisit the priorities and decide how to move forward.
9. Evaluate what has been achieved.

These are explained in more detail below.

The starting point is the scenario itself. Pre-course reading or prior preparation is not required. Someone should be asked to read the problem aloud. The students should work through the stages and approach the problem from a student’s perspective and not adopt a specialist’s role.
1. The group sits in a circle around a table in a 'business forum'.

2. Rotating the chair and scribe at each meeting gives all the students an opportunity to practice different skills.

3. Identify and clarify any terms and parts of the theme that are not clear. This is a brief, but important starting point. The purpose is to begin by making sure everyone understands the initial information.

4. Define the scenario and its components. The students should discuss the topic and decide for themselves what it is about.

5. Analyse and explore the topic by brainstorming. The group explores the breadth and depth of the topic and each student in turn contributes something about the scenario. All the statements are recorded on the flip chart (a “spider diagram” with links drawn between topics is one way) until a whole range of ideas is built up to give breadth to the topic(s). The points are not discussed in any detail at this stage. It is important to explore the full spectrum of biomedical knowledge to ensure that students are aware of the breadth of the topic. The brainstorm should take up much of the first meeting: surprisingly, this stage may be the hardest. During the brainstorming students should keep in mind the Learning Objectives that are described in the course material.

A FRAMEWORK FOR BRAINSTORMING
Generating ideas through a brainstorm is one of the most creative parts of the process and every effort should be made to explore as many components of the framework as possible. The framework is intended to encourage the students to think broadly about the significance of every aspect of biomedical science before moving into a deeper level. The questions might include "What anatomy and physiology is important here?", "what biochemistry and pharmacology" "what clinical or ethical issues" - and so forth until all the main areas of the biomedical spectrum have been considered in a general sense and noted.

Sort and list the information from the brainstorm
All the points are reviewed to establish their significance. The points may be sorted, clustered and ranked with some being discarded at this stage. Most will be sorted and grouped into a meaningful array. At this stage the points can be discussed and explored in depth and further detail. Existing knowledge can be shared and added to the group's understanding.

Clarify and prioritise the learning points
The group will now be aware of the areas that they want to know more about. The learning points should be identified and prioritised into a manageable list of learning objectives and described as questions.

PRIVATE STUDY
Working independently the members research and learn in their own time. The questions agreed form the basis for private study. All information learnt should include the factual content and the reference or source of information should be reported (the best
available evidence).

It is very important that all the students explore all the points on the list together because:
- the workload is the same for all the students and makes equal demands on the group
- at the next meeting all the students must (potentially) be able to contribute equally to a discussion about the agreed objectives

Delegated learning is inappropiate in this context because
- the process should allow each individual to increase their understanding and is not a mechanism for the group as a whole to cover as much factual knowledge as possible.
- mistakes are easily made and may then be passed to the group.
- other students cannot share the thinking, introduce alternative models or challenge errors unless they have covered similar ground.
- meetings become a session of ‘reporting back’ by students in a series of mini lectures. This kills all opportunity for discussion, since everyone feels obliged to listen.
- the last student to speak about their topic will probably not have enough time and feel discouraged
- if a student is absent that particular component will be unavailable to the group
- each student must cover all the learning objectives in any problem

Generally, it is strategically better for the whole group to learn about the same range of objectives at the same time than to allocate different objectives to individual members of the group.

SECOND MEETING
Reforming the group, revisiting the topics, reporting back and synthesising the information.

This is the point where what has been learnt in private study time is tempered and tested by genuine discussion. The students are required to apply what they have learnt by revisiting the theme, to think about the things that other students are saying and to test their own understanding. At the end of this discussion the group close the topics by summarising their discussion and forming a conclusion.

Group evaluation
This is a short oral activity. Its purpose is to develop skills of reflective practice and self appraisal. At the end of the meeting, the group should reflect on their progress. This is done by emphasising the positive experiences they have had (by identifying something they particularly enjoyed learning about or doing), or by reflecting on something that should be avoided, or done better next time. The facilitator may invite the group to consider some alternative approaches to working through the problem, for example a different sequence of steps through the problem, a different structure for presenting material on the flip chart.
Summary of the PBL stages

A. First meeting:
   1. Orientation
   2. Introductions to the group
   3. Elect chair and scribe
   4. Read the problem
   5. Analysis brainstorm
   6. Comprehension
   7. Formulate questions
   8. Review brainstorm
   9. Summarise key point as questions (learning objectives)

B. The group breaks up for students to study as they wish
   - investigation
   - each student works through the questions
   - information is gathered from learning resources

C. Second meeting
   1. Orientation
   2. Group reforms
   3. Elect new chair and scribe
   4. Re visit the problem
   5. Re visit the questions
   6. The group assembles answers to the questions (each question can be brainstormed)
   7. Ideas are shared and tested, new questions raised
   8. A summary is made of the points discussed
   9. Firm conclusions are acknowledged
   10. Points of uncertainty are described as new questions (learning objectives)
   11. Evaluation
   12. Review the experience and prepare for future discussions.