University of Manchester

Project Managing Humanitarian Aid 2013

Problem-based Learning: overview of process

What is Problem-based learning?

"Problem-based learning is an educational approach whereby the problem is the starting-point of the learning process.... Usually, the problems are based on real-life problems which have been selected and edited to meet educational objectives and criteria. However, it could also be a hypothetical problem. It is crucial that the problem serves as the basis for the learning process, because this determines the direction of the learning process and places emphasis on the formulation of a question rather than on the answer.... [The] assessment drives the educational method." (de Graaf and Kolmos: 2003)

Problem-based Learning is one of a group of learning strategies which are considered to be encompassed within the umbrella term of Enquiry-based Learning. A characteristic of these approaches to learning is that a tutor will set out a task or a problem and support or facilitate the learning "but the students pursue their own lines of enquiry, draw on their existing knowledge and identify the consequent learning needs. They seek evidence to support their ideas and take responsibility for analysing and presenting this appropriately, either as part of a group or as an individual supported by others. They are thus engaged as *partners* in the learning process," Barrett (2005).

These approaches to learning are therefore student-centred and active approaches which have as a driver or trigger the resolution of a problem or performance of a task.

Problem-based Learning (PBL) is a process which has a number of features.

- The process is based on students working and collaborating in teams.
- The process is initiated by the presentation of a problem.
- The team members are responsible for identifying what they need to learn and what information they need to find and what research, investigations and analysis they need to undertake in order to understand the problem and reach a conclusion.

Overview of PBL process within the context of the unit

The following notes provide initial supporting information concerning the PBL process and related issues. The process which underpins each exercise is made up of a number of steps.

Session 1

1. Students in their teams are presented with a real-life problem.
   Why consider a real-life problem?
   a. *Because its perceived relevance gives us an incentive to learn*

2. Students use their existing knowledge and experience to begin to actively investigate this unfamiliar situation.
   Why base the process on existing knowledge and experience?
   a. *Because learning is cumulative and builds on previous learning experiences and defining what is known allows us to define what is unknown.*

3. Students practice the use of an analytical logical approach to the problem-solving process. Various approaches can be used which all have the same generic components and start with problem-

definition by setting out what is known, what is unknown and what questions need to be asked and researched. This can be done in the format of a table with 3 columns.
Why start with defining the problem, surely we are told what it is?
a. Each problem has specific characteristics and is embedded in a specific context both of which can be unfamiliar and hidden from view. Dealing with the unfamiliar requires a questioning approach.

4. Students are encouraged to continue to identify what further knowledge and understanding is needed so as to develop as full a picture of the problem as is possible.
Why is this?
a. PBL is an active learning approach which depends on setting and answering your own questions; as this challenges us to think deeply about what we understand and this leads to effective life-long learning,

5. Students collaborate in the analytical subdivision of the questions and the synthesis (the process of combining different ideas, influences and information based on reasoning) of the answers. Agreement has to be reached as to who will research each question, also which question is fundamental and therefore should be researched by all (the common question).
Why undertake collaborative questioning and synthesis?
a. This process promotes deep learning which is based on understanding rather than superficial learning. It also enables all to benefit from combining different expertise and viewpoints. This is needed to find solution options to wicked problems.

Subsequent sessions
In subsequent sessions the process includes further steps.

1. Students will have researched the common question (the question they were all to investigate) they set themselves. Two students (chosen at random) from different disciplines share with their team what they learnt about the common question through their individual research. Each student should speak for 5 minutes; the other students should listen and then ask questions for clarification. The facilitator will ask if all are happy with the responses given.

   The above activity is useful for both the presenters and other team members. It encourages thinking not just about the content but also prompts individuals to ask themselves the following questions.

   Did I research or tackle the question in the same way?
   How is my discipline or my approach different?

   The above activity is therefore an exercise in critical appraisal; of information.

2. Following the discussion of the common question, students present the information relating to the individual questions they investigated. There should be time for others to ask for clarification.

   The above activity focuses on a different skill as individuals are informing and teaching others.

3. The three columns in the Session Process Framework table should be reviewed at this stage. More information and research may be needed for a subsequent meeting and consideration will need to be given as to how to plan for and reach a conclusion.

   a. *Why do we go through this iterative process of questioning evaluation and synthesis again?*
   By constantly adding new information to our problem definition we build a more accurate picture of the problem which promotes re-evaluation.
   Misconceptions can be corrected rapidly.
   There is early feedback on the result of learning.
   Active thinking develops more effective storage in the long-term memory.
   We learn how to inform others
   We learn how to listen.

We learn how to participate in discussion.
We learn how to collaborate with colleagues.
We acquire the ability to use knowledge in a professional context.

4. Students develop a plan to complete the deliverable and delivery of the report on time.

   This activity develops skills of collaborative negotiation and professional responsibility.

5. At the following session, once the report has been submitted and evaluated, feedback is provided from the external expert. This leads to a discussion about the task and the process and the experience of PBL as a learning strategy.

   Learning from experience and the individual's development through self-assessment are important here.

6. The facilitator will introduce the next topic. Students should use and build upon the skills they have learnt in tackling the next topic.

Summary of the benefits of PBL

PBL enables students to:

- Practise a logical and analytical approach when resolving unfamiliar situations;
- Activate their existing knowledge to underpin the problem-solving process;
- Practise the integration of new knowledge with existing knowledge;
- Understand the relationship between context and problem;
- Practice critical reasoning and critical appraisal;
- Practise self-directed learning;
- Practise a range of communication skills;
- Practise being both a contributor to a team and a collaborator within a team;
- Practise reflective learning.

References

Barrett, T (2005) "Understanding Enquiry-based Learning," in T. Barrett, I. MacLabhrainn, and H. Fallon (eds.) *Handbook of Enquiry and Problem-based Learning; Irish Case Studies and International perspectives*, Galway: AISHE and NUI Galway.

de Graaf E and Kolmos A (2003). Characteristics of Problem-ased Learning. *International Journal of Engineering Education*. Vol. 19, No. 5, pp. 657-662.