researchsnapshot

Problem-Based Learning and the Development of Metacognition

What is this research about?

The researchers were interested in finding out whether problem-based learning would have a significant impact upon the development of metacognition in first year university students. Defining metacognition as 'thinking about thinking' the researchers noted it also involved "knowing how to reflect and analyse thought, how to draw conclusions from that analysis, and how to put what has been learned into practice" (p. 610).

The researchers argued that in order to effectively solve problems, students need to understand "how their mind functions" (p. 610) and hypothesized that "problem-based learning should produce significant metacognitive development in undergraduates when compared to non problem-based approaches which do not always require the same reflective performance" (p. 610).

Two instructional approaches were used with two different groups in this study. One programme followed a distinctively non problem-based course of study while the second group of students participated in a programme that followed an exclusively problem-based approach. This allowed the researchers an opportunity to compare the impact of PBL across two programmes in the same discipline.

The PBL approach consisted of seven broad steps which included:

1 clarifying terms and concepts not readily understood;
2 defining the problem;
3 analyzing the problem;
4 summarizing various explanations of the problem into a coherent model;
5 formulating learning objectives;
6 identifying and completing individual study activities outside the group; and
7 reporting and synthesizing the newly acquired information.

The non-PBL group experienced a more traditional approach whereby the subject matter was determined largely by the lecturer, and the focus was on declarative and procedural knowledge, rather than functioning problem-based knowledge. Although students were free to choose their own learning strategies and approaches, subject matter, feedback and assessment were largely in the hands of the lecturer.

What did the researchers do?

In order to explore the impact of problem-based learning (PBL), researchers administered a questionnaire which required students to report their perceptions about their thinking and problem-solving skills and strategies to the two groups of students.

What you need to know...

Researchers noted that, "the nature of the design of the problem-based learning environment is critical to success. If insufficient attention is paid to providing the appropriate levels of scaffolding and support to students then they are unlikely to show the significant metacognitive development" (p. 620).

What did the researchers find?

The researchers found that the group of students who experienced the problem-based approach to instruction (as compared to the non-PBL group) showed:

- a greater reduction in anxiety levels
- significant increase in levels of motivation
- significant increase on the attitudinal scale
- a significantly greater increase in their ability to identify important information, prepare effectively for examinations, and reason through a question when answering it
- a significantly greater improvement in their ability to focus their attention, manage their time, review their learning, and develop aids to assist with problem-solving

The extent and significance of the difference between the two groups "surprised even the researchers on this project" (p. 616).

What are the opportunities for problem-based learning in your subject-area?

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