Principle 2
Encourage the spirit of critical inquiry and creative innovation informed by current research

Case Study 2
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While undertaking a Graduate Certificate in Higher Education in 2004, I conducted research into my students’ approaches to learning and problem solving in first year Biochemistry and Biological Chemistry courses. This study revealed widespread adoption of surface learning and a fragmented understanding of fundamental concepts. This surface approach to learning is compounded by the tendency of traditional science teaching to focus on delivery of content. Because of the rapidly expanding knowledge base, science curricula are forcing students to adopt inappropriate learning strategies. My goal has been to improve student learning of basic concepts by engaging students more actively and develop generic skills such as problem solving by focusing on understanding rather than acquisition of factual content.

I have undertaken four initiatives to improve feedback and assessment, and to assist students to engage in critical thinking and problem solving:

First, I introduced keypad technology (personal response systems) to facilitate discussion in lectures and allow students to get immediate feedback on their learning.

Second, to encourage more independent learning, I introduced take home assessments where the students are given a problem (for example a set of data from an enzyme reaction and asked to determine kinetic constants by suitable graphical analysis). This allowed them time to digest the theory and work out how to apply it in a non-stressful situation. These assessment tasks were followed up in lectures by explanation and working through the problems in both the first and third year classes.

Third, in the majority of courses that I teach, I have established self-assessment tests on the Blackboard course web site to provide students with immediate feedback on the correct answer with an explanation.

Fourth, I have incorporated Case study teaching with its emphasis on active learning and problem solving within complex real world contexts in the course.

In order to promote deeper learning, I have made the lectures more interactive with frequent use of videos, animations and web links, to assist student understanding of a particular topic. I have developed effective strategies in which lectures are interspersed with challenge questions, which require students to consolidate the material presented and respond to problems designed to challenge their new understanding. Students who see learning as sense-making or comprehension are disposed to adopt deep approaches.