Learning Chemistry Through Enquiry

Talking About... Learning & Teaching: Case Study 003

University of Birmingham

Start Date: Autumn 2007

Students: 1st year undergraduate (LC)

Scope: Proportion of credit bearing module

Approach: Enquiry-Based Learning (EBL)

Technology: WebCT (VLE)

Type: Campus

Discipline: Chemistry

Cohort Size: 80 - 130

Initial Funding: LDU

Initiative Introduction: Within undergraduate curriculum

Impact: Embedded in a Y1 module and aspects of EBL also now incorporated into a Y2 and a Foundation Year module

Design Team:

Dr Natalie Rowley and Mr Tim Lucas (MPhil Chem. Ed., 2009)

Introduction

This learning design was created to address the challenge of enabling first year undergraduate students to become more independent learners. The area chosen for re-design (interpretation of spectra) had previously been taught by lectures and a series of workshops. An enquiry-based learning design (a number of real-world scenarios) followed by a reduced number of lectures was chosen in order to address issues of content, problem solving, team-working and communication skills.

Learning Design

Students learn to interpret spectra from some spectroscopic techniques at A Level. However, experience shows that their prior knowledge is quite variable depending upon the syllabus defined by their A Level board. In order to gauge the students' perceived confidence in their ability in the techniques required for the first year module, they were asked to complete a brief questionnaire before the module began. Based upon these findings, the students were placed in groups (typically six students per group), such that each group had at least one member who had expressed confidence in their ability to interpret spectra for each of the techniques.

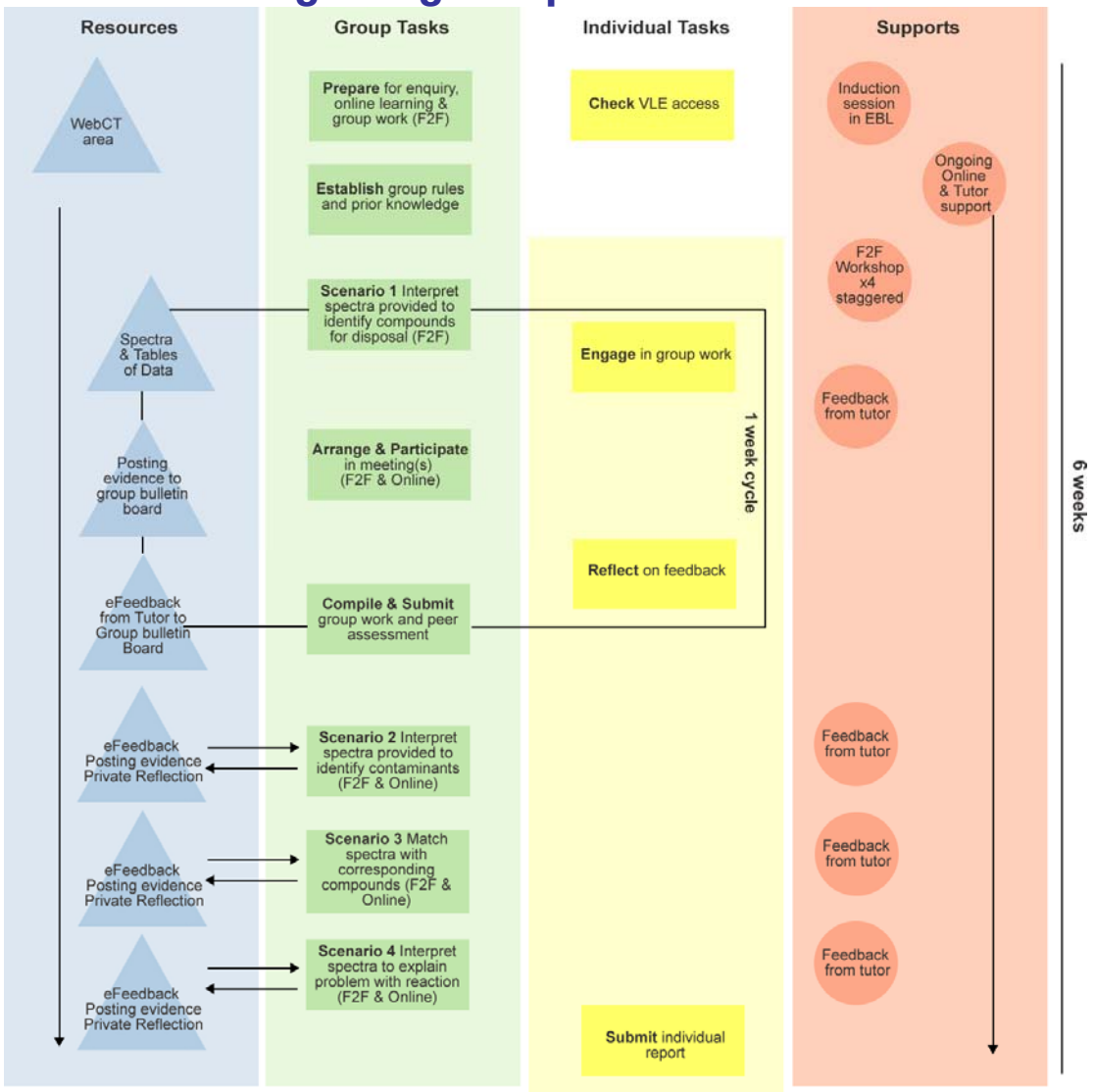
The first task students were given in their EBL groups was an ice breaker (a general science quiz). Each group of students was then asked to establish its own group rules to which the students would adhere whilst working together. The students then discussed their perceived prior knowledge of interpreting the various types of spectra in order to establish their group's overall knowledge at that point. The students were then taught about the steps required to problem-solve using EBL, action planning to help with their time management, and netiquette which they would need when posting to discussion boards within WebCT. The students then participated in a number of real-world scenarios, placing them in the role of graduate chemists working for a fictional company. In their teams the students attended one 2 hour EBL session per week for six weeks. The sessions were facilitated by five postgraduate students with the member of staff delivering the EBL trigger and then acting as an additional floating facilitator. Each week the students received their scenario trigger, and began work within their group. During the remainder of the week each group was given access to a WebCT discussion board, hence the member of staff was able to facilitate all of the groups online between EBL sessions. The output, either a group or individual report was handed in for marking at the beginning of the following session, and the students received feedback on their work through WebCT generally within 24 hours of submission so that this could inform their work for the next assessment. Finally, five 1 hour lectures with a focus on the theory behind the techniques were delivered once the EBL sessions were complete.

The students were assessed through a combination of continual assessment (on a number of their group and individual reports), a small proportion of peer assessment relating to their contribution to the group, and by end of year examination.

Summary

Feedback from students has generally been very positive as they can see the benefits from learning in this way to their employability skills.

Temporal Plan: Learning Design Sequence



Student Learning Outcomes

- Interpret simple mass, infrared, ^{13}C and ^{1}H NMR spectra;
- Understand how the spectroscopic techniques work;
- Be independent learners;
- Work as a team member in a group.

Contact Information

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Further Information Available Online: http://www.ebl.bham.ac.uk/bham/case6.shtml

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