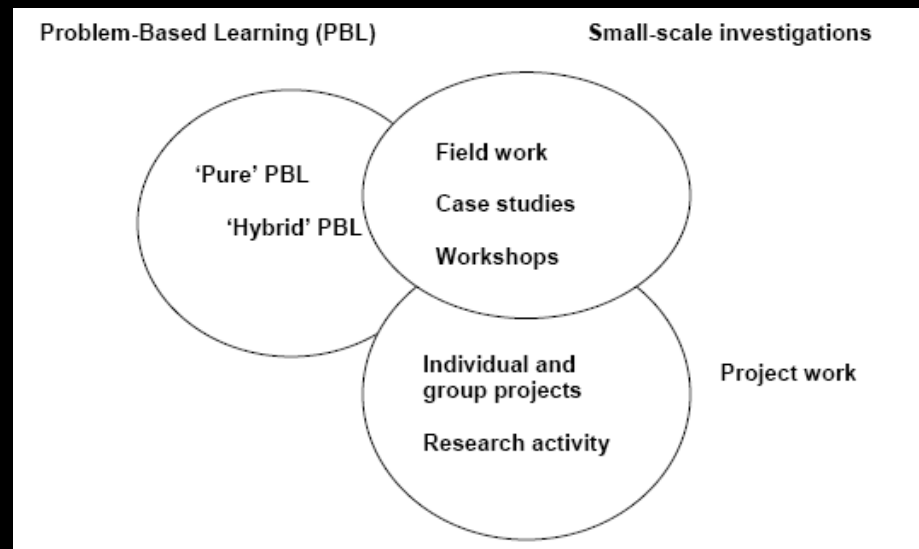


U Preliminary Findings
of Using Enquiry-
Based Learning in
Chemistry **B**

Tim Lucas & Natalie Rowley, School of Chemistry
29th August 2008

Enquiry-Based Learning (EBL)

- **Broad umbrella term for learning approaches driven by a process of enquiry**



Kahn, P. and K. O'Rourke, Guide to Curriculum Design: Enquiry-Based Learning. 2004, Higher Education Academy.

EBL Characteristics

□ **Strongly Student Centred.**

- Students follow their own lines of enquiry.
- Shift from tutor to facilitator.

“It gives you freedom to think for yourself and gives you the opportunity to find the answers yourself.”

□ **Group Work**

“Helped build my confidence when working in groups. Other people help me on things I haven’t learned before.”

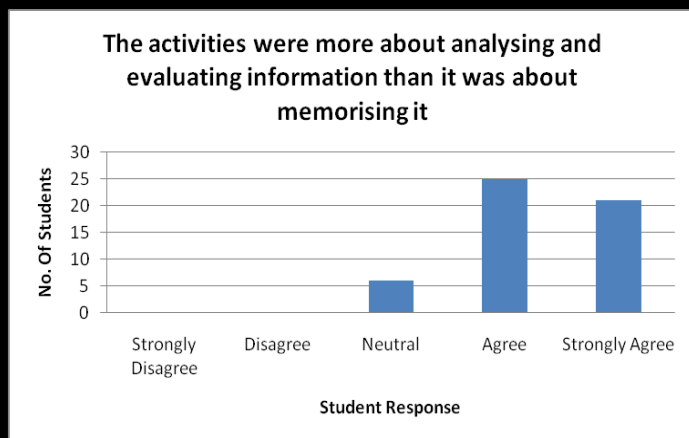
EBL Characteristics

□ Involves Active Learning.

“I like the idea of doing our own research to solve the identity of the compound.”

□ Promotes Deeper Learning.

– understanding and application for life



EBL Characteristics

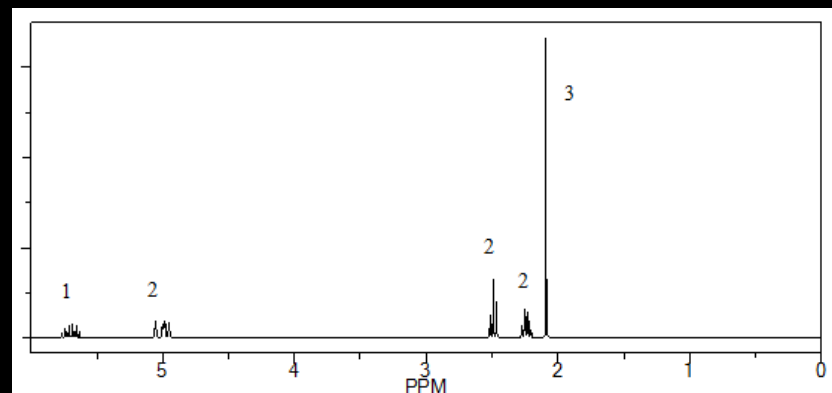
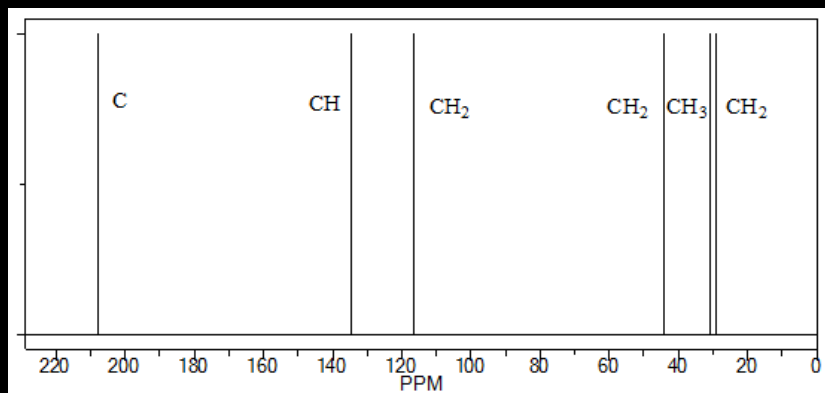
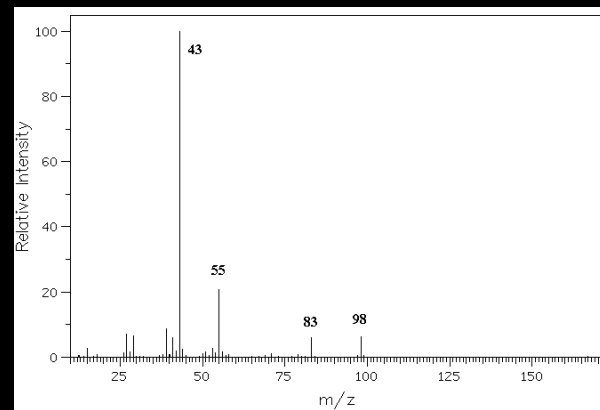
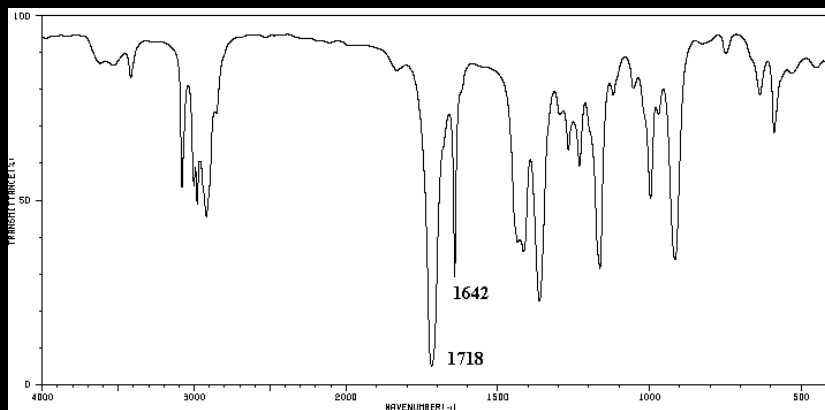
□ Open-ended and ill-structured

“Make it more structured in what we have to do, and when.”

□ Based in the “real world”.

“It introduced a new way of attacking problems and ‘learning on job’ style was nice.”

First Year Spectroscopy



Traditional Approach

- 6 x 1 hour lectures (theory and introduction to interpretation of spectra)
- 6 x 2 hour workshops (practise interpreting spectra – whole class, ca. 4 PG demonstrators)
- Assessed Worksheet
- End of year examination

EBL Approach

- **Groups of ~ 6 students (selected by us)**
- **Ice Breaker**
- **4 scenarios – online and PG / Staff facilitation**
- **Assessed Worksheet 1**
- **5 lectures - explaining how theory underpins interpretation of spectra**
- **Assessed Worksheet 2**
- **End of year examination**

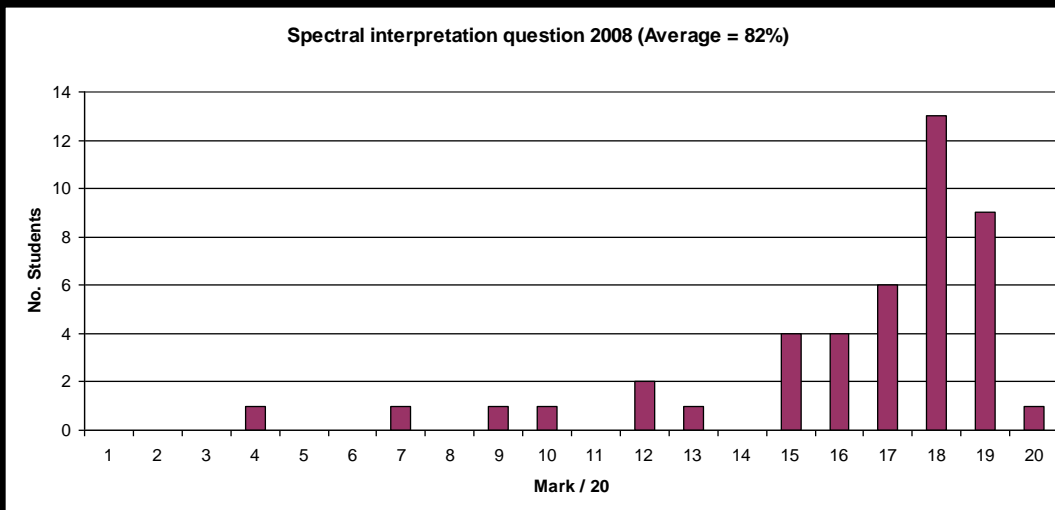
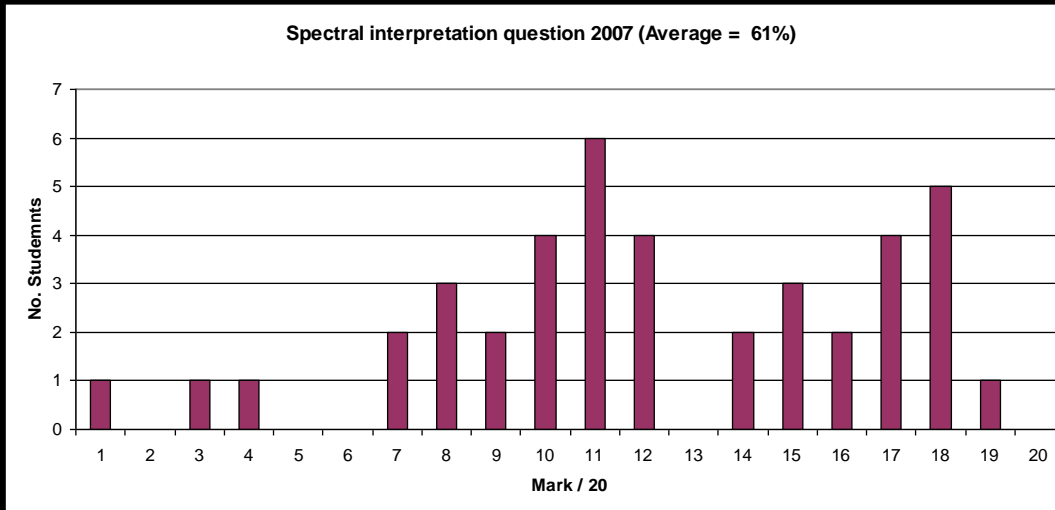
Four Scenarios

- ***“Down the Drain”***
 - ***Group Report + Peer Assessment***
- ***“Waste Disposal”***
 - ***Group Report + Peer Assessment***
- ***“Carbonyl Conundrum”***
 - ***Group Report***
- ***“Reaction Dilemma”***
 - ***Individual Report + Peer Assessment***

Evaluation

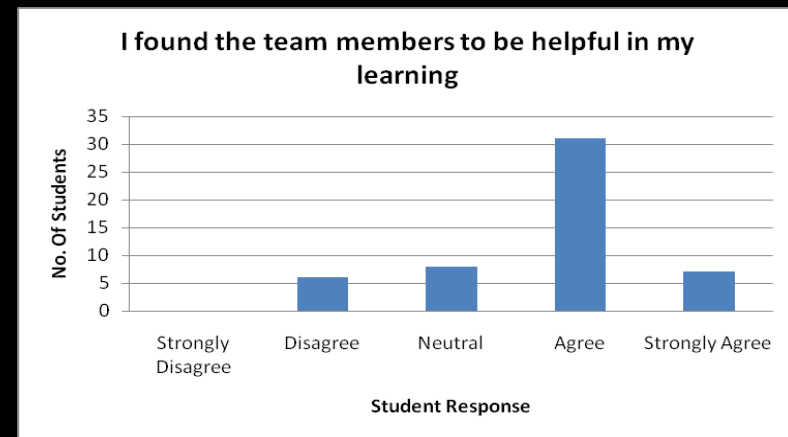
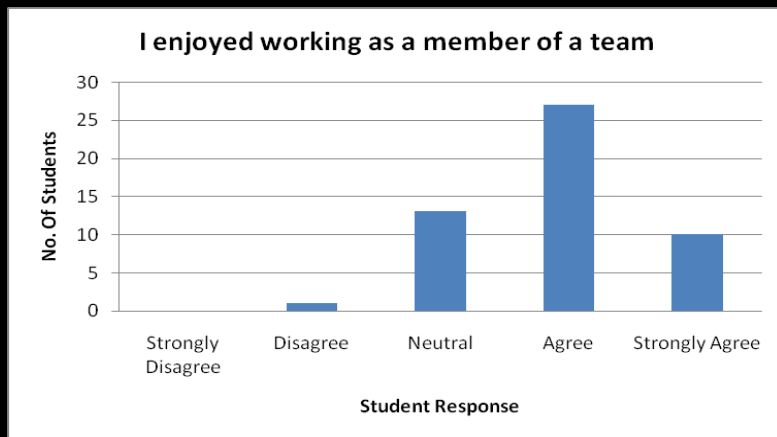
- Questionnaires
 - Likert scale questions
 - Short answer questions
- Focus group with Undergrads
- Interview with PG Demonstrator
- Exam question results
- Reflective log

Exam Question Data



Feedback – Group Work

- **Focus Group - students liked working in groups and seemed to appreciate other student's input in their learning.**
- **Students liked the opportunity to meet new people from their course.**



Feedback – Group Work

- **However, students experienced frustration with unequal participation in the groups.**
- **Peer Assessment on 3 Scenarios**
 - 8% of total marks available
- **Didn't work as well as we had hoped**
 - average mark of ~93%
 - 77% of marks given were 100% on final scenario

Feedback – Practicalities

□ Friday afternoon 4-6 pm not popular!

“I sometimes found it hard to concentrate as we had 2 hours of lectures prior to it and it was late on a Friday afternoon.”

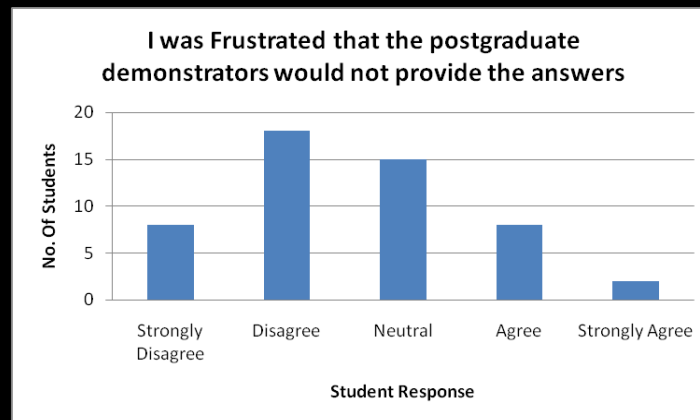
□ Issues with the venue

- Too crowded
- Too noisy

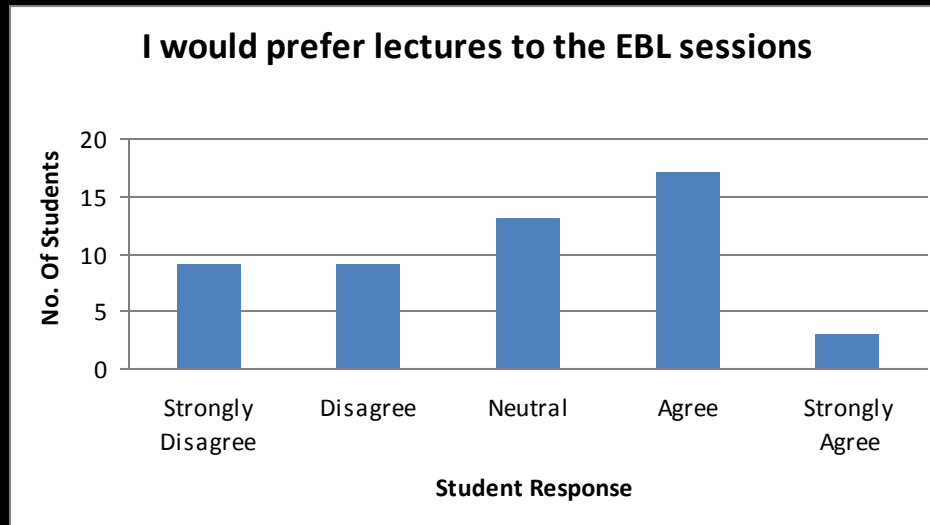
Demonstrators

- Focus group - postgrads were helpful on the whole.

“One postgrad was giving us clues, rather than just giving us the answers, which was really good – pointing you in the right direction”



Feedback – EBL vs. Lectures...



- Focus Group - students enjoyed the EBL sessions more than the lectures because they could interact with each other rather than just being ‘spoon-fed’.

Students Suggested Improvements

- **Not on Friday afternoons**
- **Less crowded room**
- **Do lecturers on theory first**
- **Change the assessment**

Acknowledgements

- **Liam Cox (Chemistry, University of Birmingham)**
- **Bob Hunter (LDU, University of Birmingham)**
- **Mike McLinden (Education, University of Birmingham)**
- **Tina Overton (Chemistry, University of Hull, Director of HEA Physical Sciences Centre)**
- **University of Birmingham for funding**

Further Information

Enquiry Based Learning Case Study

<http://www.ebl.bham.ac.uk/bham/case6.shtm>

BETA online publication

http://www.landdevelopment.bham.ac.uk/journal/documents/Rowley_BETA_Vol1_No2_Pg3_v.1.pdf