Where will IT end? Using information technology in University education

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ICT & Education: This lecture will explore

Some general issues involved with using ICT in education at a
• University level
• Department level
• Student level

Sample quantitative and qualitative data collected from 'ChemCAL'
• How students use ChemCAL
• Does this indicate anything about study habits?

ICT & Education: Current Climate

• Contracting resources
• Increasing pressure on academics
• Higher expectations of quality & efficiency
• Expanding student base

ICT & Education: Web of Learning

Formal:
• Lectures
• Tutorials

Informal:
• Study groups
• Duty tutor

On-line:
• WebCT
• ChemCAL
• Self-help problems

Off-line:
• Assignments
• Textbooks
• Lecture notes

ICT & Education: University Issues

• Reputation of University
• Integration
• How to review progress
• Major cultural shift for staff and students
• Provision of central or local resources (hardware + personnel)
• Mission statement

ICT & Education: Department Issues

• Cost and efficiency – applications/staff
• Design of material - are the learning objectives changed?
• Who pays for continued support and development?
• Does it work?
ICT & Education: Student Issues

- Expectations of University – ‘modern’ learning
- Access to computer – home or University facility?
- Speed and time of access – are there issues at home for the students?
- Time management – cannot use on-line material on the bus!

ICT & Education: Advantages to students

Flexible learning
- Multi layered program possible
- Comfortable environment
- Feedback at time of work
- Less time on campus (jobs)
- Self paced learning
- Access 24-7

ICT & Education: Educational benefits

- Learning styles
  - No single educational package for all
  - Keyboard skills
- Computer ability
  - Excellent for “drill and practice”
  - Not responsive to unexpected question
- Quality Assurance
  - ‘External’ review

ICT & Education: Evaluation

Method
- Request for on-line feedback
- Computer usage data
- Student surveys
- Word of mouth

Purpose
- Ensure educational benefit
- Improve programs/applications
- Justify current and future resources

ICT & Education: The big question

Does it work?
- Evaluate what we have
- Review what is new
- Keep this process going
ICT & Education: Applications in Chemistry

Replace "wet labs" – simulations

Communication

Support of content
• Presentations
• Asynchronous learning
• Formative and summative assessment

ICT & Education: ChemCAL

Aim of this study

• Benchmark USYD and UMELB
• Examine how students use this resource - log data
• Student perception of this resource – questionnaire (N = 737; 460)

ICT & Education: Check of demographics

The population returning the surveys appeared representative of the wider student cohort

Very similar demographics at both Universities

ICT & Education: Use of ChemCAL

ChemCAL is used at both USYD and UMELB

• It is constructed of a series of modules with information, animations, questions, hints and explanations
• It is available to all first year chemistry students
• It forms part of a raft of resources
• It is not compulsory

ICT & Education: Use of ChemCAL

Students were asked how often they used ChemCAL (N=737, 460)

The majority of students use ChemCAL at least a little

Log data indicates a mix of steady use during the semester and cramming at just before exams
ICT & Education: Use of ChemCAL

Those that did not use ChemCAL were asked why.

<table>
<thead>
<tr>
<th>Reason for not using ChemCAL</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>No clear reason</td>
<td>40%</td>
</tr>
<tr>
<td>Study issues</td>
<td>10%</td>
</tr>
<tr>
<td>Technical difficulties</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>50%</td>
</tr>
</tbody>
</table>

ICT & Education: Use of ChemCAL

The students that did use ChemCAL were asked:
1. advantage over textbooks
2. can go back
3. can manipulate material
4. rotate 3D images
5. provides useful feedback
6. feedback improved learning

ICT & Education: Best and worst

Aids learning and tests understanding
Immediate feedback
24/7 accessibility
Questions
Immediate feedback
Visual impact
Technical difficulties/download times
Drag & drop presentation
Better than textbook
Work at own pace
Visual impact
Immediate feedback
Difficulty to access shockwave
Difficult to access
Explanation/hints too brief
Technical difficulties/download times
Nothing
Technical difficulties/download times
Pages with no interaction
Technical difficulties/download times
Explanations/hints too brief
Technical difficulties/download times
Technical difficulties/download times

ICT & Education: Stoichiometry

Reduction of Iron(III) Oxide

The reaction can be predicted by the reaction of iron oxide with carbon monoxide. Balance the equation:

\[ \text{Fe}_2\text{O}_3 + 3 \text{CO} \rightarrow 2 \text{Fe} + 3 \text{CO}_2 \]

Examine Log data

Attempted all
240 marks attempted of 9 possible
npnts = 378
average = 6.5 ± 2.3

For students that attempted 9 marks, what was their score?

For students that attempted only Q1, what was their score?
ICT & Education: Stoichiometry - summary

Less than 50% get the equation balance correct at their first attempt.

Less than 50% calculate the number of mol of iron from 1 kg of iron oxide (based on an equation which is now correct)

About 60-70% can turn that number of mol into a mass of iron correctly

Hints and explanations were used, but only by ~10-20% of users
ICT & Education: Kinetics

UMELB 85% USYD 75%

Just show me: UMELB 5%; USYD 3%

ICT & Education: Big issues

University
Ongoing support for ICT developments supported by one-off grants
Workload issues for academics involved

Department
Can we help students use their own IT and communication for self-learning networks

Student
Social and technical issues with students studying at home

ICT & Education: Conclusions - ChemCAL

• Student do use resource & feel they benefit from it
• All or nothing approach but generally high level of engagement
• Some of the basics (eg stoichiometry) can not be assumed — ‘underpinning’ material need to be available
• Students do perform well on questions given time (how does this translate to pressure of exams?)

ICT & Education: The End