Messiah or Myth: The core values of technology in university education and learning

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The University of Melbourne

The University of Melbourne

“Going to University”

“Going to University”

Ballarat Campus

(Aquinas)

Brisbane Campus

(McAuley at Banyo)

Canberra Campus

(Signadou)

Melbourne Campus

(St Patrick's)

“Going to University” has Changed

Higher Education Policy

- ‘Mass’ participation
- More vocationally-oriented education system
- A ‘deregulated’ higher education sector
- Increasingly competitive, global higher education market
- Increasing Higher Education costs … to the student

SOLVE

Educational Technology

- Rapid technological change and adoption
- The gradual maturation of online learning
- Social Networks: informal learning communities
- Open Educational Resources: Free, high quality, online content
- MOOCs: credentialing, nano degrees

Technology as Messiah

Image removed

But … It's a Myth!

Educational technology has failed to live up to its promise.

- Educational technology has not revolutionised or fundamentally transformed teaching, learning and assessment in Universities.

- Universities have not done a particularly good job of using technology in systemic ways to enhance and support teaching, learning and assessment.

But … It's a Myth!

Educational technology has failed to live up to its promise.

"... the realty is that e-Learning is still marginal in the lives of most academics, with technology being used for little more than acting as a content repository or for administrative purposes"

- Grainne Conole, 2004.

"...the formal use of computer technologies in many areas of higher education could best be described as sporadic, uneven, and often 'low level'"

- Neil Selwyn, 2007.

Why?

- *Given such promise,*

WHY

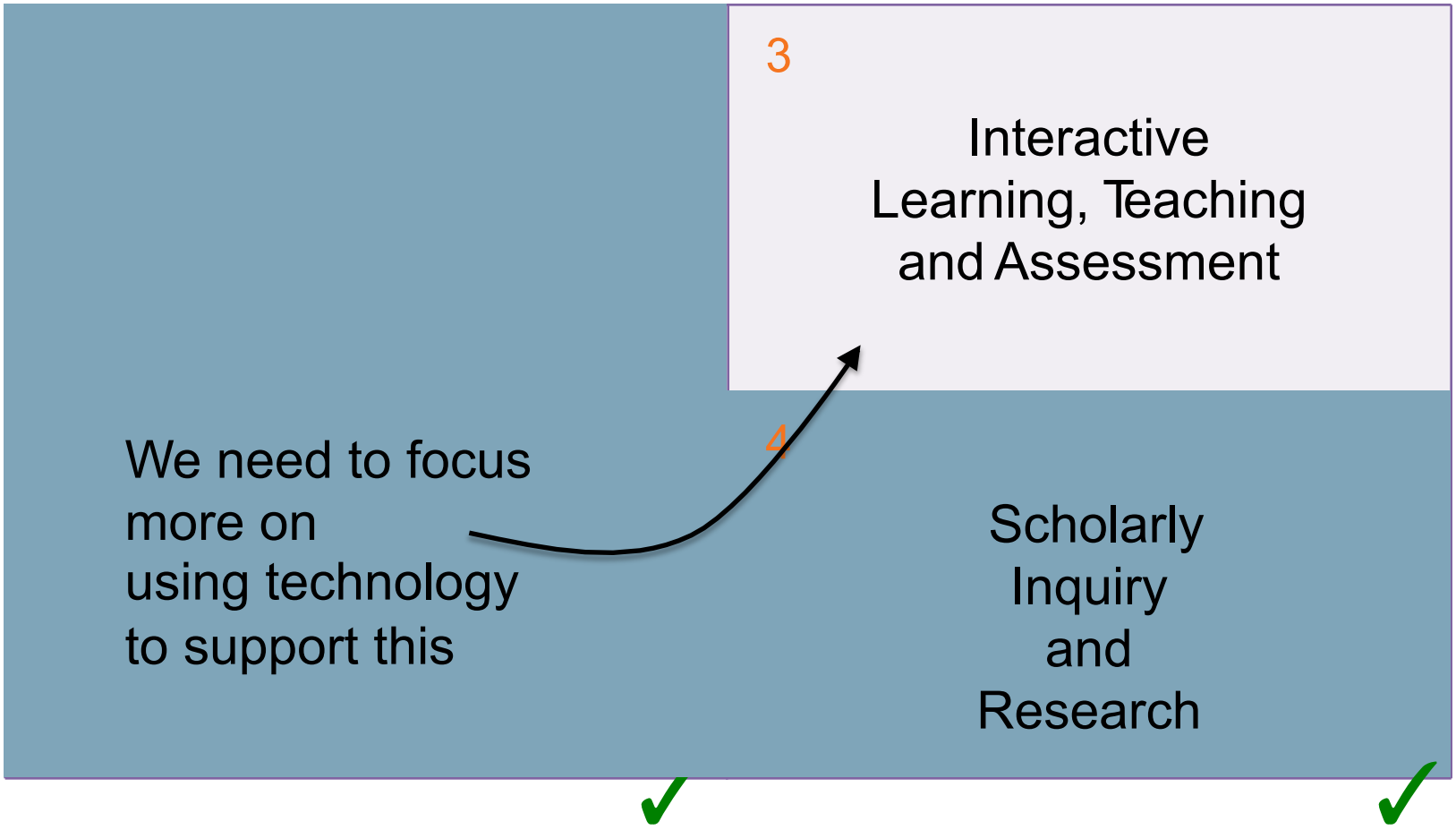
- *have educational technologies been more Myth than Messiah in their transformation of*

- *teaching, learning and*

Why?

1. We tend to focus on the wrong thing

The Value of Educational Technology

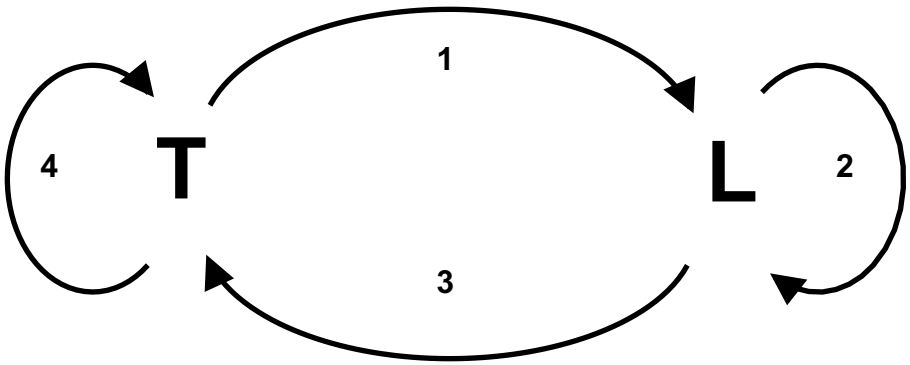


Interaction and Interactivity is Key

Teacher-Learner	Learner-Learner	Learner-Content

Defining Educational Interaction

Teacher-Learner



Defining Educational Interaction

Learner-Learner

Social Learning Theories

- Vygotsky

  Different viewpoints are inherent in collaborative work and this results in the “co-construction of knowledge”. Intra-individual conflict may occur in the process of “reciprocal sense making” which results in cognitive change.

- Piaget

  Different viewpoints are inherent in collaborative work which results in inter-individual conflict. The resolution of this conflict – assimilation and accommodation – results in cognitive change.

Defining Educational Interaction

Learner-Content

Taxonomies and Classifications

e.g. Schwier & Misanchuk (1993)

- Functions
- Transactions

How do you do Interaction?

Why?

Given such promise,
WHY
have educational technologies
been more Myth than Messiah
in their transformation of
teaching, learning and assessment?

Examples

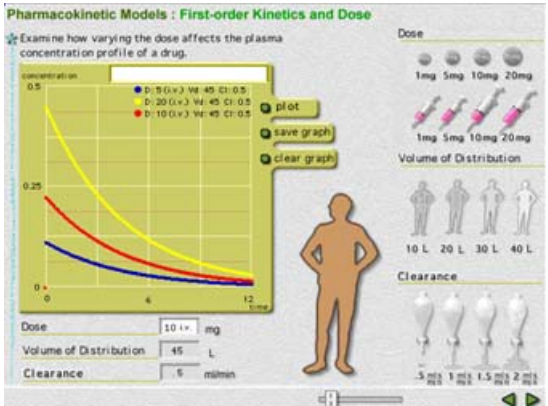
2. Often we fail to design for interaction

Example 1: Interactive Multimedia

- Allow students to explore how pharmacokinetic concepts – dose, volume of distribution, clearance – affect pharmacokinetic parameters – half-life and peak plasma concentration.

- An emphasis on conceptual understanding rather than mathematical formulae.

- Employs real life examples and analogies, interactive tasks, and a “faux” conceptual simulation.



Did Students Like It?

- Tested with 173 Medical Students in a problem-based curriculum
- Students' perceptions of usefulness (9-point scale)

Resource	Mean	Std Dev
Pharmacokinetics Tutorial	7.33	1.37
Text Books	6.78	1.62
Lectures	6.72	1.41
Lecture Notes	6.68	1.37
Personal contact with Tutors	6.21	2.17
Group discussion	6.12	1.93
Journal articles	4.04	2.43

Did it Work?

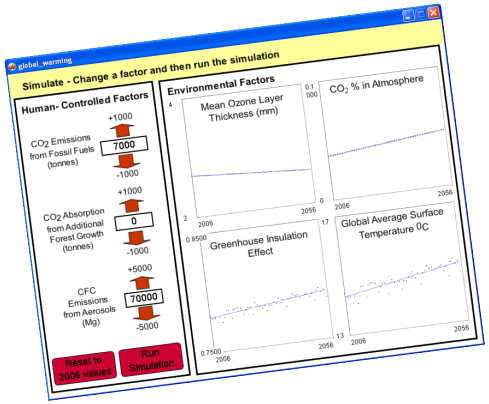
- Tested with 173 Medical Students in a problem-based curriculum
- Students' knowledge (5-point scale) and perceived confidence (7-point scale)

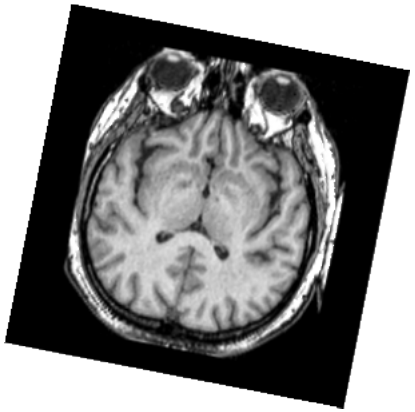
	Pre-Test Mean (SD)	Post-Test Mean (SD)	F	p
Knowledge	3.85 (.98)	4.17 (.87)	4.16	<.001
Confidence	4.59 (1.22)	5.97 (.87)	17.48	<.001

Barney Dalgarno — Charles Sturt University

Sue Bennett — University of Wollongong

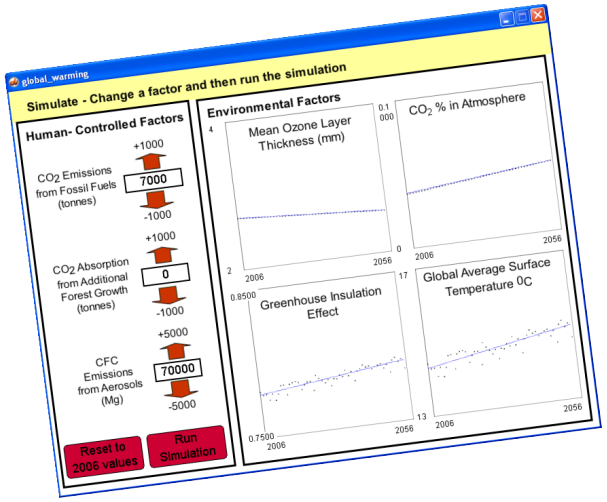
How does the learning design of interactive multimedia programs affect students' learning approaches and outcomes?





Learning Design A

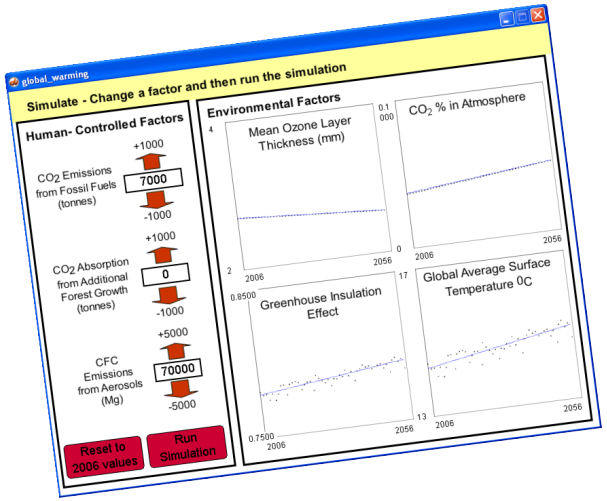
Exploration Learning Design



- Content screens: an introduction with background terminology.
- A conceptual simulation task.
- A “predict, observe and explain” task; students are given a scenario, they alter simulation values, observe the impact, and have to work out fundamental principles.
- Students manipulate various parameters.

Learning Design B

Tutorial Learning Design



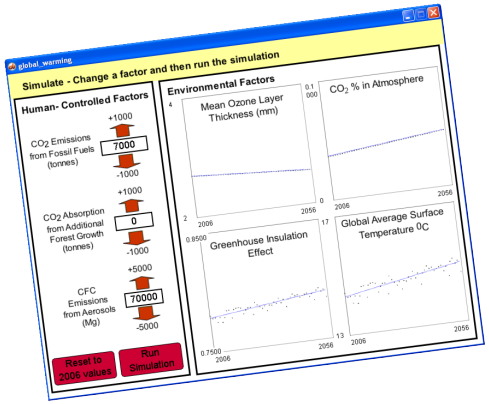
- Content screens: an introduction with background terminology.
- A “page-turning task”.
- Content screens that show students the impact of altering values of “a simulation” on an particular outcome.
- Students were not able to manipulate the parameters.

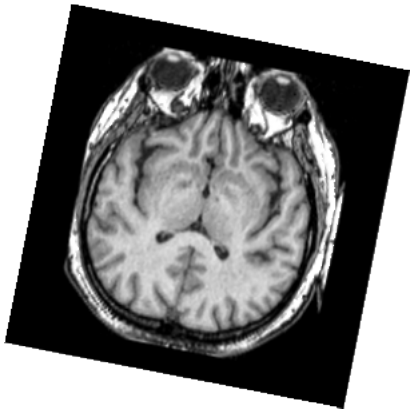
Method

- Cross over design

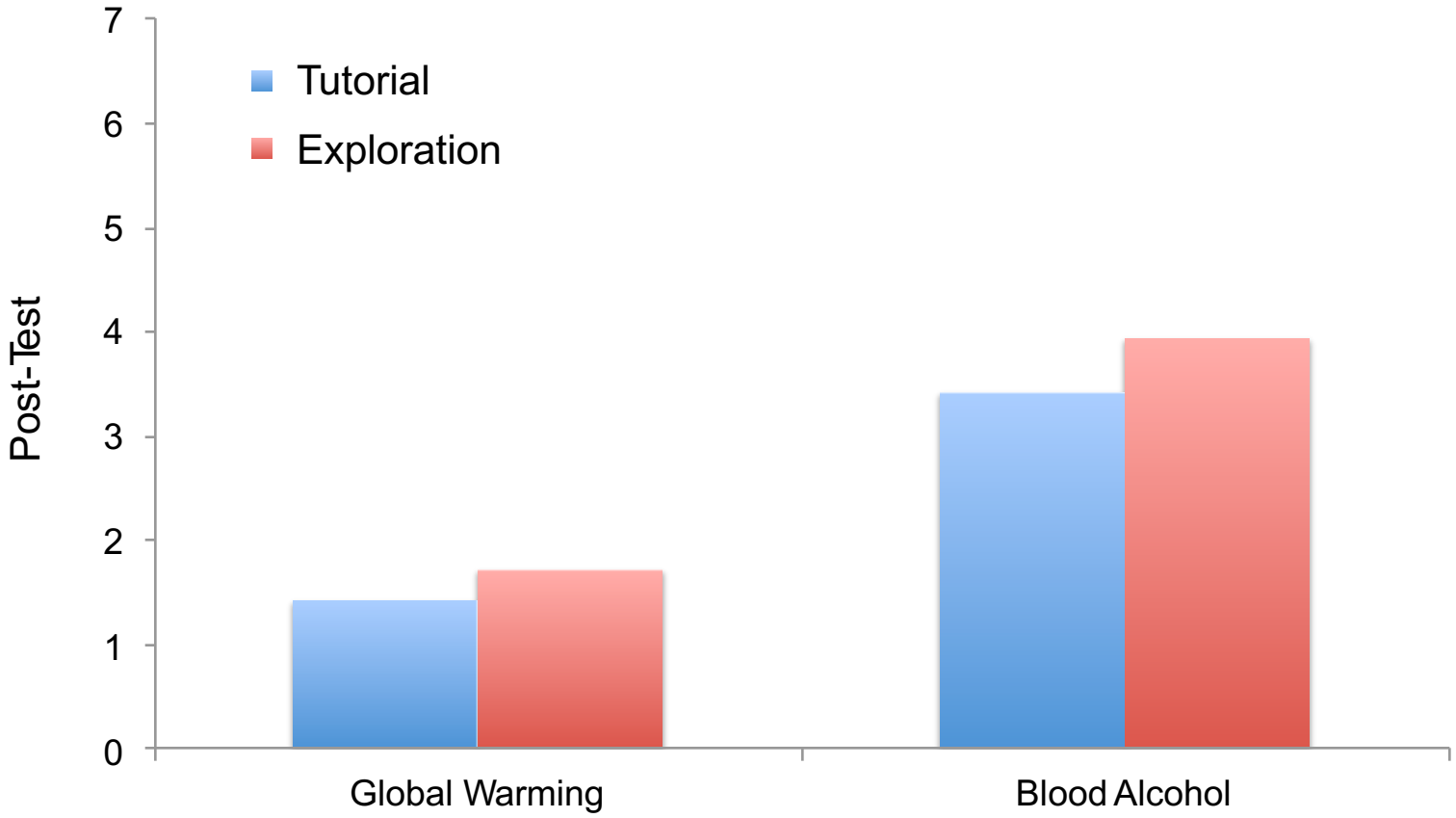
- Each student completed:
  - the tutorial program in one content area (Global Warming)
  - the exploration program in a second content area (Blood Alcohol Concentration)
  - a pre and post-test of knowledge in each content area

- Students' learning behaviour and activities were logged.





- No statistical difference between groups for Global Warming
- Only a modest difference between groups for Blood Alcohol



- We noticed there was a great deal of variation in the post-test scores for students in the exploration condition.

- Eyeballing the logs showed some students seemed more systematic in their exploration of the simulation than others.

We characterised students' approaches to learning with the simulation using a simple rule.

Systematic Exploration

- Students who consistently completed simulation “cycles” – predict, observe, explain – changing only one variable at a time.

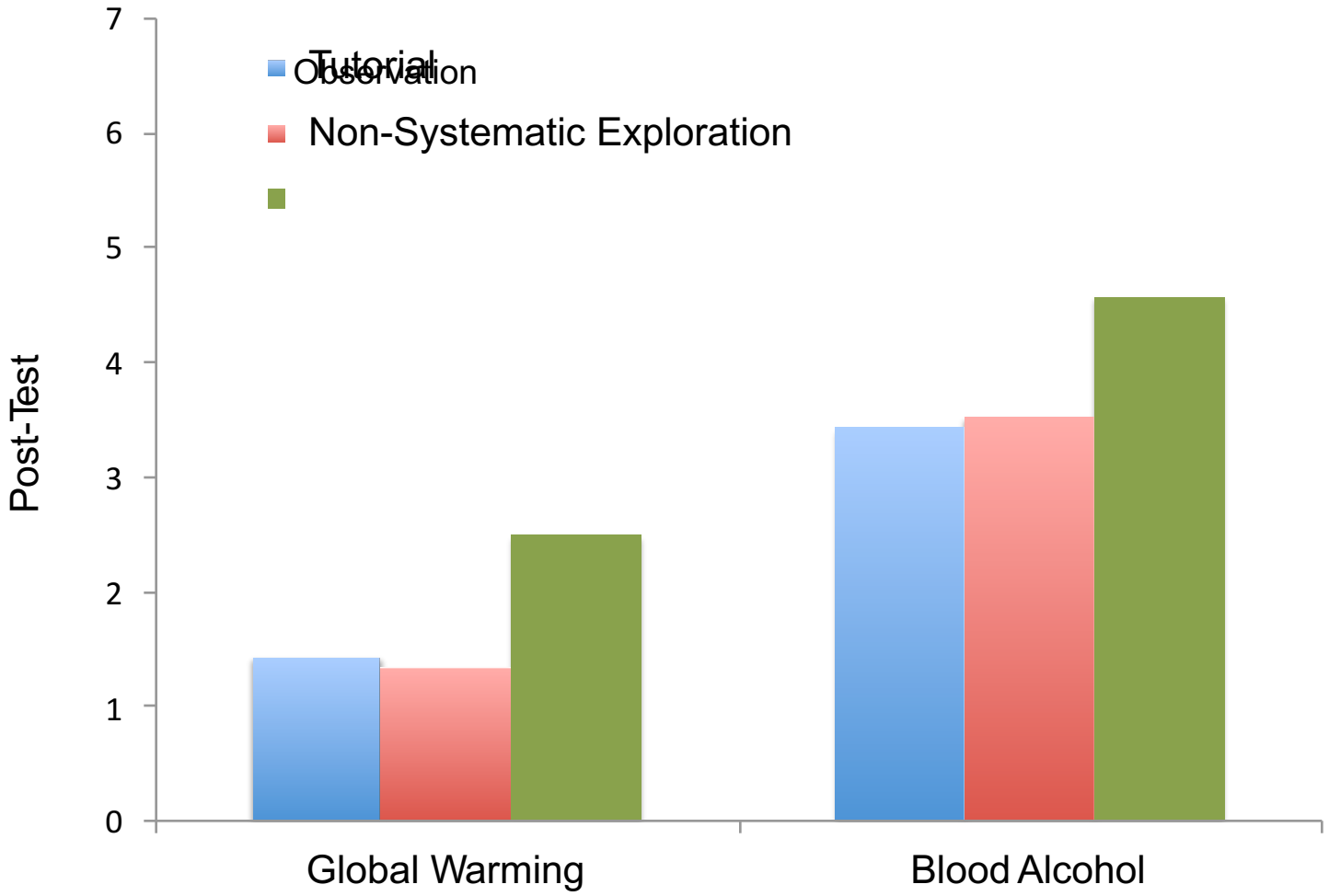
Non-Systematic Exploration

- All other “exploration” students

Tutorial

- Students who completed the Tutorial learning condition (no simulation)

The “systematic” group differed from the other two groups in both domains



Example 2: Online Learning

ORALE ONLINE: A COMPUTER MEDIATED C O CATION E O N M E N T F O R T E A C G LAW

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ABSTRACT

Dispute Resolution and Legal Ethics (LRALE) is a subject taught by Prof Martin Davies. All law undergraduates at the University of Melbourne must complete the subject in order to qualify for admission to practice law. The subject's aim is to give students the necessary background on the resolution of disputes, the ethical responsibilities of a lawyer, and the duties owed to the law, the court and the client. This involves practical things such as handling casefiles and communicating with other parties, including opposing law firms, senior partners, the client, the court, and other agencies. Students need to learn the mechanics of the dispute resolution process as well as the ethical issues involved in the process. For example, clients must be asked for direction at critical stages, and all documents which go out of a Law firm should be signed by all partners in the firm.

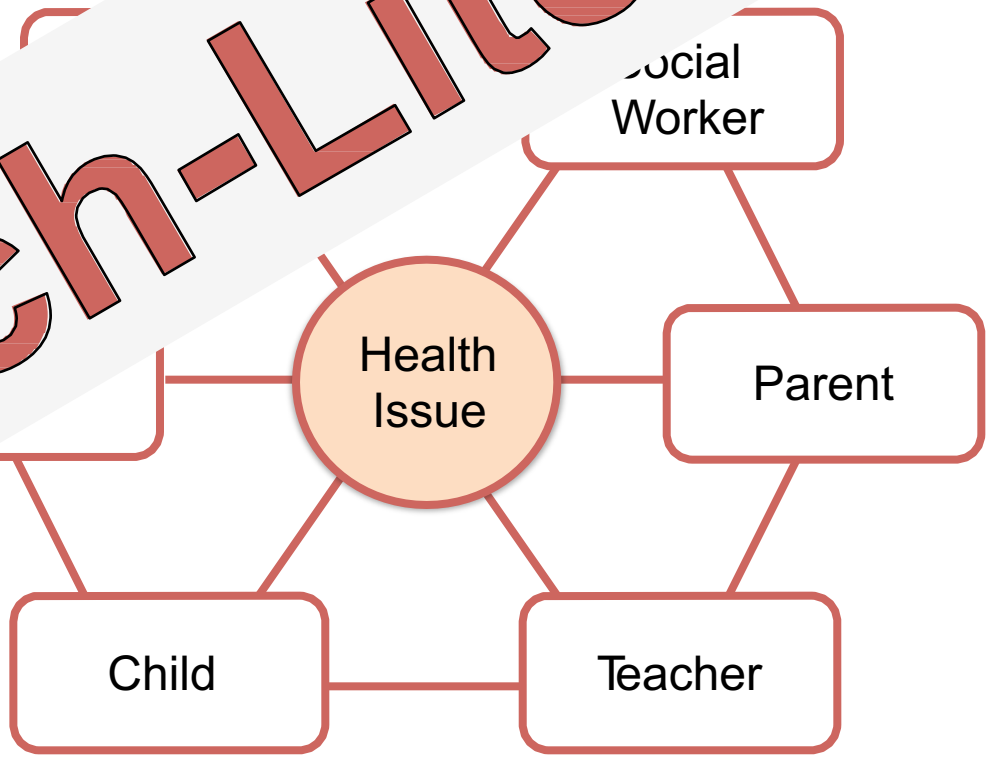
ORALE Online is a system which has been developed to simulate this process in a web-based environment. This is not a distance learning unit. Students who study this unit also participate in face to face lectures and tutorials. Real casefiles have been modified to remove identifying information such as company names, and then placed on the system. Each student is assigned to a Law firm with 4 other students. These firms are then made either plaintiffs or defendants, and matched with an opposing firm. When

Example 2: Online Learning

- Problem based : Ill-structured problems used as a vehicle for developing students' understandi
  concepts, processes and princi

- Scenario
- Authentic
- Role D

Tech-Lite



Example 3: Social Media

WoRDPREss

Two Photo Sharing Activities

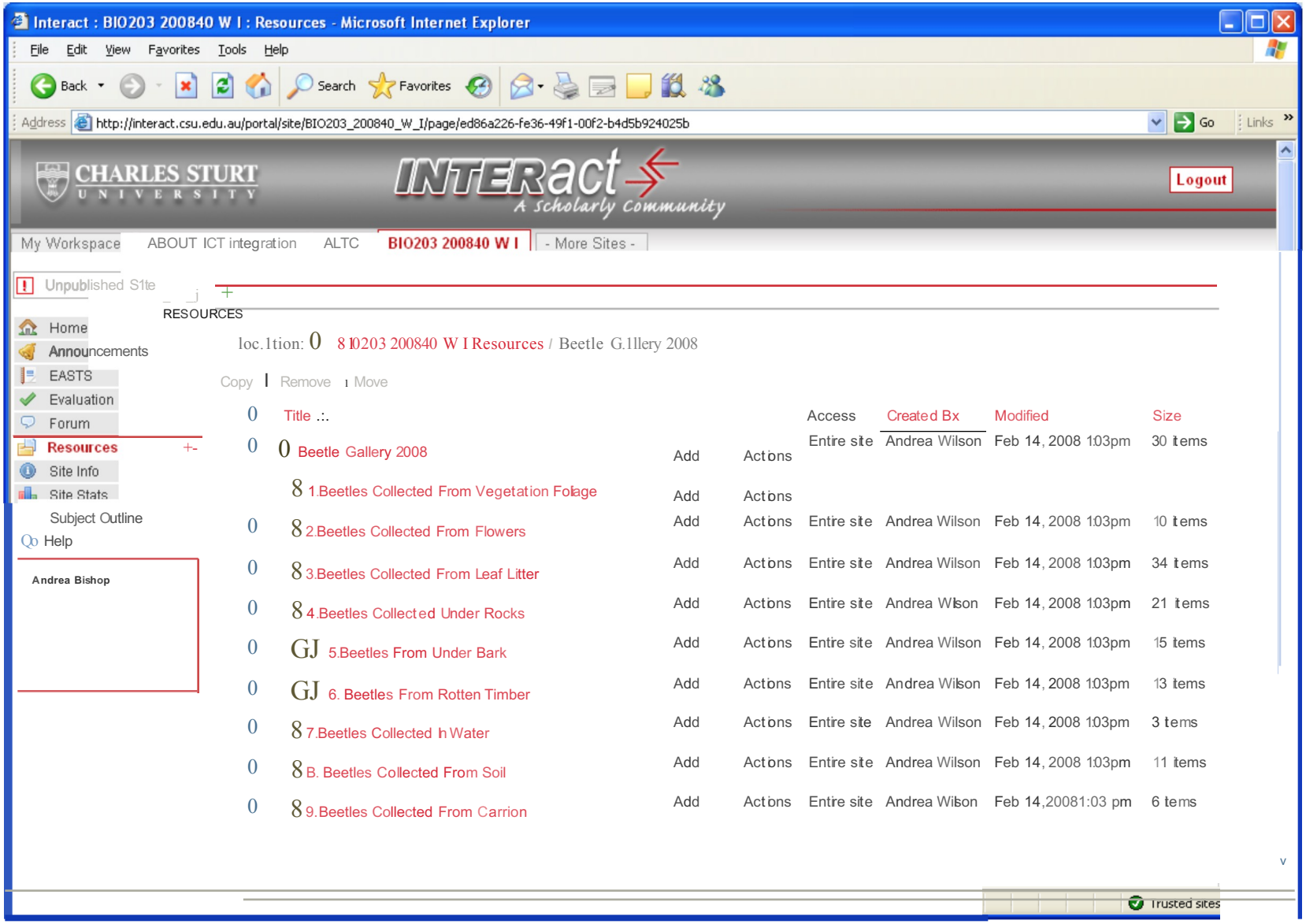
Learning Design A: Beetle Gallery

- A traditional beetle collection exercise extended with technology.
- 30% of assessment mark.
- Campus-based and distance students (n ~ 40) uploaded and shared digital images in an online “Beetle Gallery”.
- Undertook comparisons of shared images.

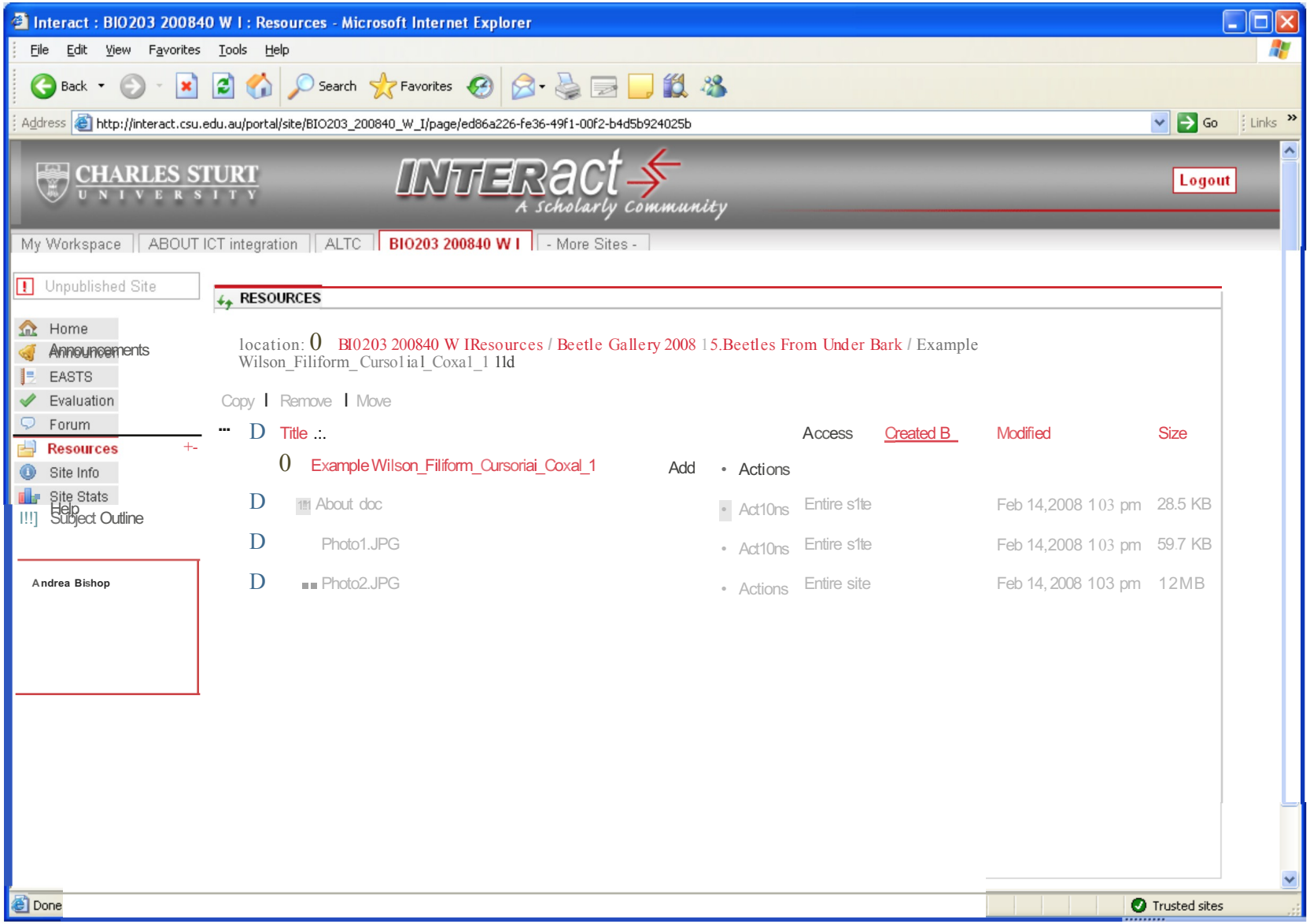
Learning Design B: Chem Flickr

- Document key principles covered in Chemistry lectures as they occur in everyday life.
- A ‘hurdle’ assessment requirement.
- Campus-based students (n ~ 900) uploaded and shared digital images in an online gallery, captioned and tagged them.
- Commented and voted on others’ images.

Beetle Gallery



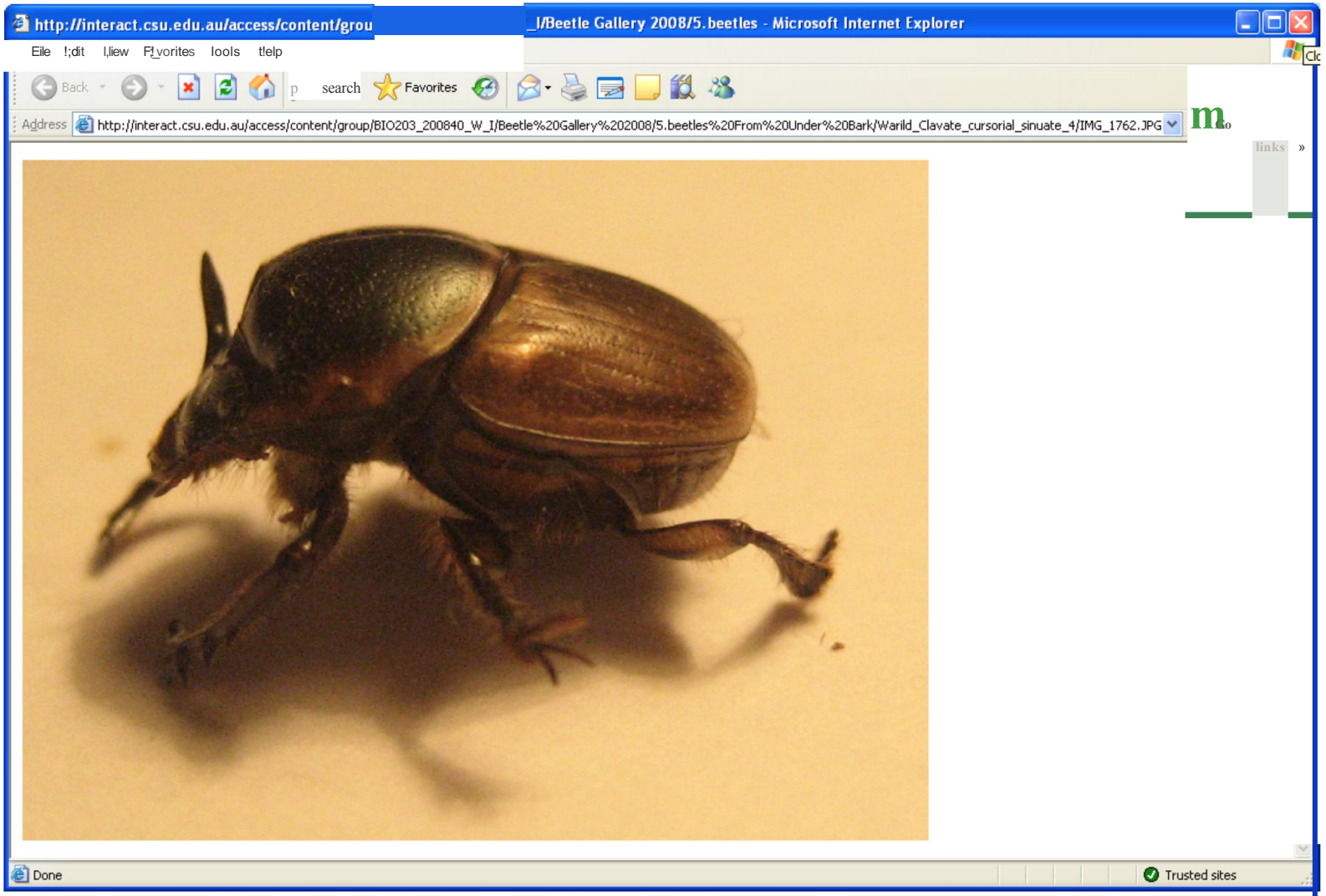
Beetle Gallery



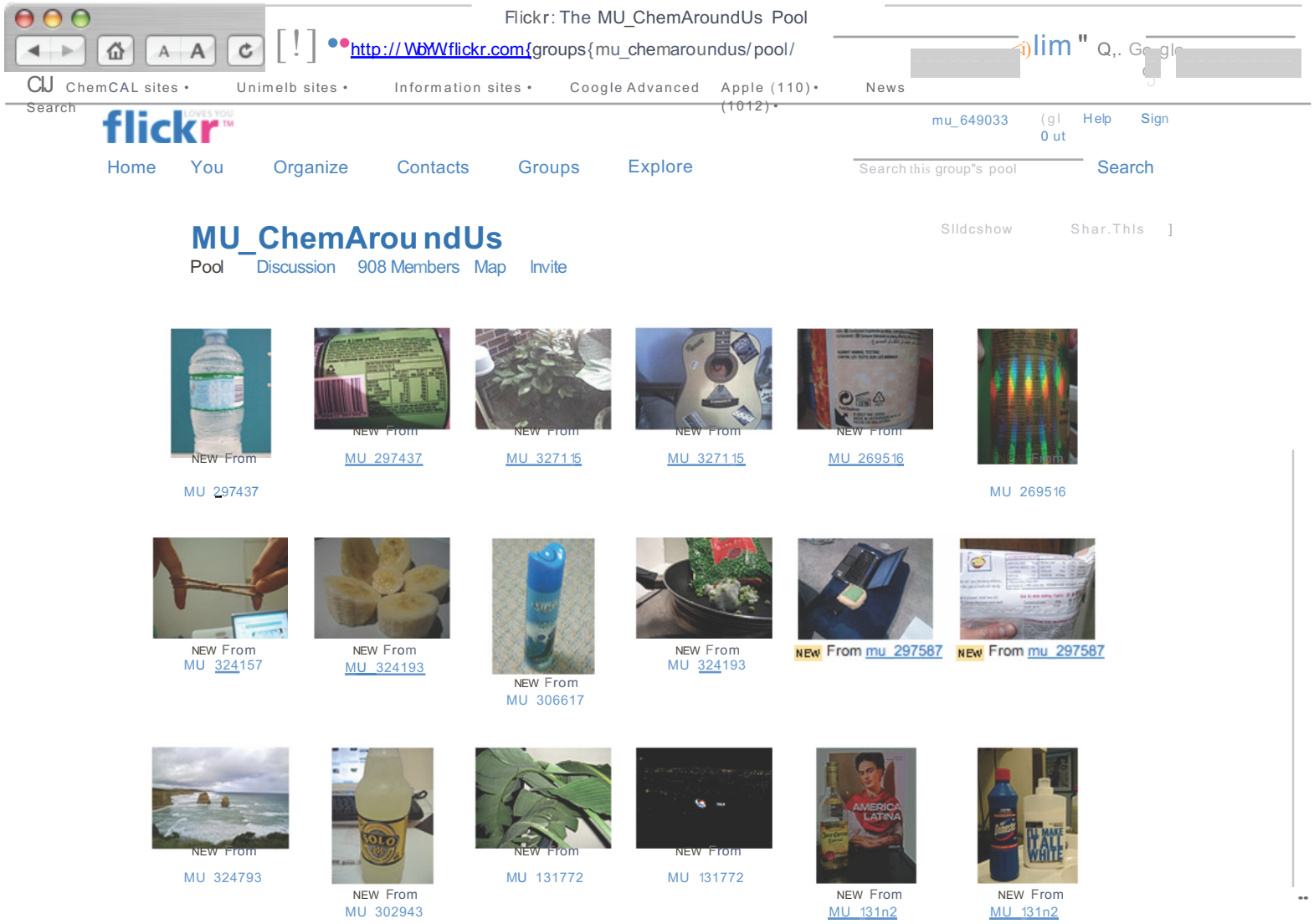
Beetle Gallery

File name	Habitat	Antenna type	Leg type	Thorax type	Pronotum structures	Wing colour	Wing pattern	Other Comments
Wilson_Filiform_Cursorial_Coxal_1	Foliage of rose bush	Filiform	Cursorial	Coxal	None	Black	Striated	Collected in NSW in March 2007

Beetle Gallery



Chem Flickr


Flickr: The MU_ChemAroundUs Pool
http://www.flickr.com/groups/mu_chemaroundus/pool/
ChemCAL sites
Unimelb sites
Information sites
Coogle Advanced
Apple (110)
News
flickr
Home
You
Organize
Contacts
Groups
Explore
Search this group"s pool
Search
MU_ChemAroundUs
Pool
Discussion
908 Members
Map
Invite
Slideshow
NEW From MU_297437
NEW From MU_327115
NEW From MU_327115
NEW From MU_269516
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NEW From MU_324157
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NEW From MU_306617
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NEW From MU_324793
NEW From MU_302943
NEW From MU_131772
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NEW From MU_131n2
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Chem Flickr

chem1 on Flickr - Photo Sharing!

http://www.flickr.com/photos/25896413@06/2511141450/in/pool-mu_chem

ChemCAL sites | Unimelb sites | Information sites | Google Advanced Search | Apple (111) | News (1019)

flickr

Home You Organize Contacts Groups Explore

Help Sign Out

mu_649033

Search

chem1

ADD TO FAVES | ADD NOTE | BLOG THIS | ALL SIZES

The ears In this picture represent chlral objects which don' superimpose on each other but a mirror Image of each other, while the ear rings represent symmetric objects

Add your comment

(Some HTML is OK)

Uploaded on May 21, 2008
by MU-324080

+ photostream

MU_ChemAroundUs (Pool)

1 707

browse

Tags

cht.al
superimposed
symmetric

Add a tag

Additional Information

This photo is public

- Taken on May 21, 2008
- Viewed 10 times

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Chem Flickr

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http://www.flickr.com{groups{mu_chemaroundus{pool/tags/
ChemCAL sites
Unimelb sites
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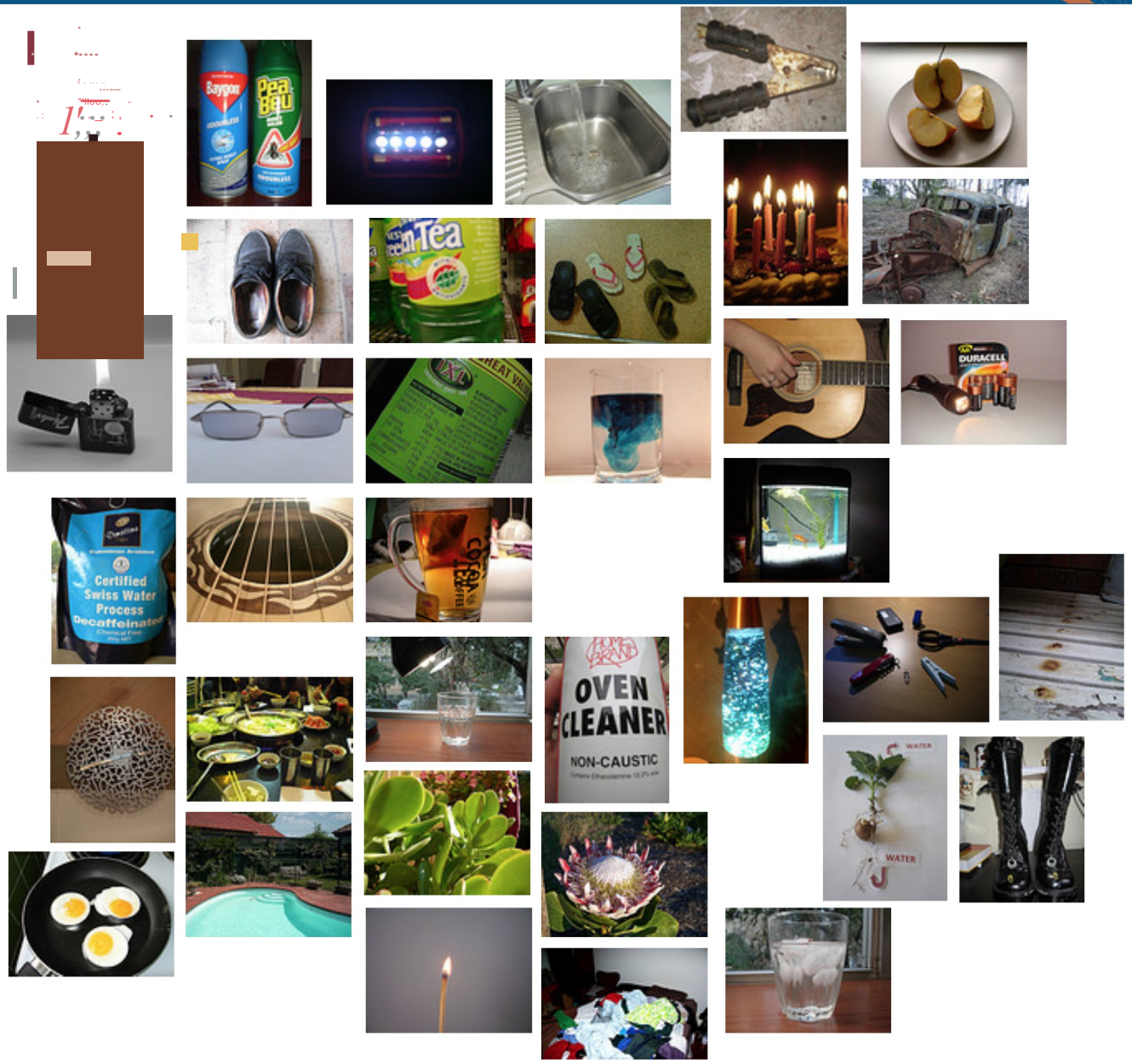
Google Advanced Search
Apple (110)..
(1012)..
News
flickr
Home
You
Organize
Contacts
Groups
Explore
mu_649033
Help
Sign Out
Search this group's pool
Search
MU_ChemAroundUs / Pool / Tags
acid acidity acollectionofsymmetricandasymmetricobjects apple asymmetric balance batteries battery biodegradable blood boilingwater burning chemcomposition chemical chemicalcomposition chemicalequilibrium chiral chirality chiralobjects cleaning combustion composition control controlacidity controlofacidity conversion cordial corrosion detergent disorder drink dynamic dynamicequilibrium electrons energy energyconversion entropy environment environmental equilibrium evaporation fast fastoxidation fertilizer fire food free fruit green greenwashing guitar heat ice iron law light lighter manufactured match metal milk music natural object objects organic oxidant oxidation ph photosynthesis plant productlabel redox rust rusting second secondlaw secondlawthermodynamics shampoo slow slowoxidation sparkler standing standingwaves stove swimmingpool symmetric symmetry thermodynamics toaster toothpaste topic topic6controlofacidity travelling travellingandstandingwaves travellingwaves washing water waveproperties waves wine
What's this?

Chem Flickr


Certified
Swiss Water
Process
Decaffeinated
OVEN
CLEANER
NON-CAUSTIC
DURACELL
WATER

Comparison of Outcomes

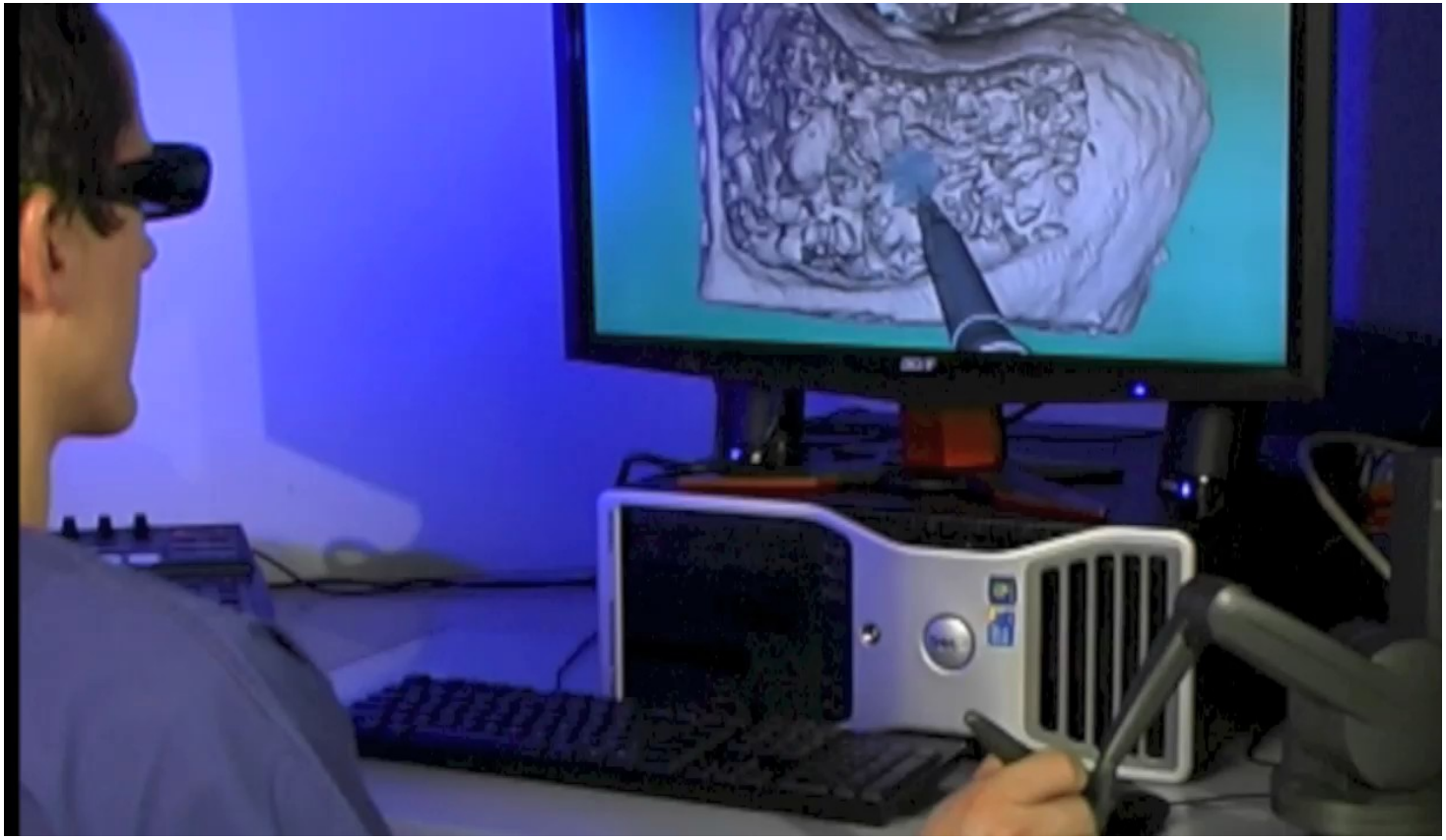
	Beetle Gallery	Chem Flickr	
	Mean	Mean	t
Helped me better understand the material			
Improved my ability to reflect			
Improved my ability to share my knowledge			
Helped me develop thinking skills			
Helped me develop research skills			

Comparison of Outcomes

	Beetle Gallery	Chem Flickr	
	Mean	Mean	t
Interesting	4.8	3.2	- 3.56*
Easy to Use	4.9	3.5	- 3.12*
Useful	4.7	2.8	- 4.35*
Enjoyable	4.7	2.9	- 4.30*
Boring	2.2	4.1	4.10*
Irrelevant	2.2	4.4	4.20*

* Sig.

Example 4: Procedural Skills Simulation



Learning Design

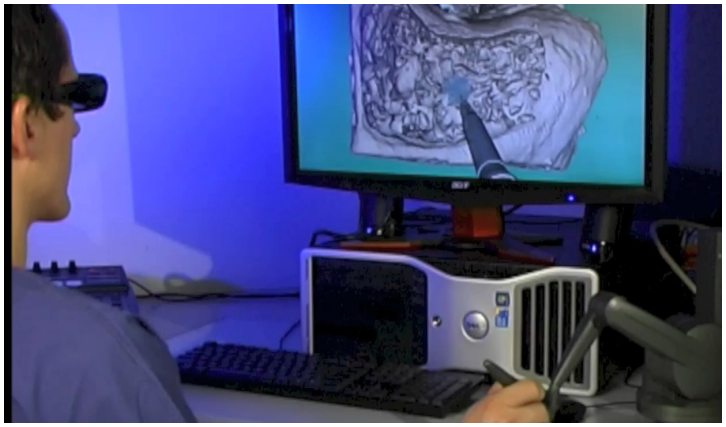
- Learn how to complete a cortical mastoidectomy

"Drill away the bone behind the ear … safely"

- A procedural simulation task which aims to develop students'
  - psychomotor skills
  - procedural skills
  - decision making skills

- An deeply immersive, interactive, authentic and adaptive digital learning environment

Does it work?



- Zhao, Y., Kennedy, G., & O'Leary, S. (2011). *The Laryngoscope*, *121*(4), 831-837.
- Zhao Y., Kennedy G, et al. (2011). *Otolaryngology Head and Neck Surgery*, *144*(3), 357-364.
- O'Leary, S., et al. (2008). *The Laryngoscope*, *118*(6), 1040-1046.

Learning Design

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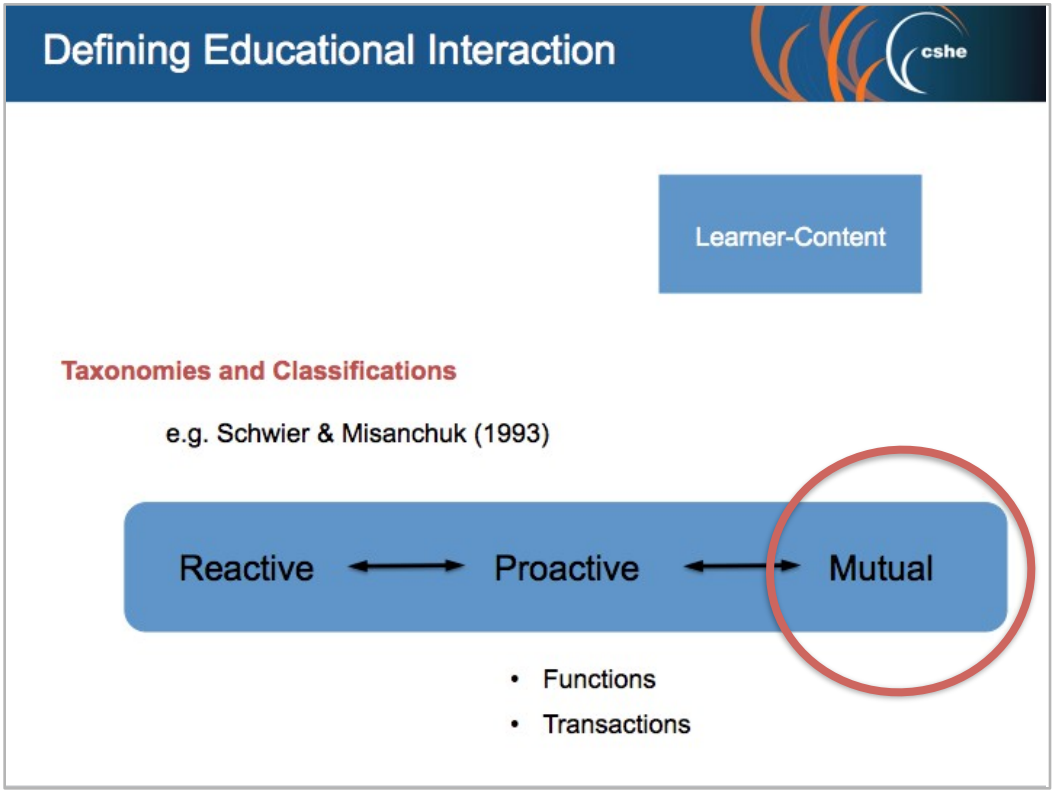
Mining Interactions for Feedback

- We wanted to use records of students' interactions to provide personalised, adaptive feedback to surgical trainees.



Interaction Metrics

- Tool position in 3-dimensional space
- Tool orientation – pitch, roll, yaw
- Force – how much pressure applied
- Distance to key anatomical structures
- Surgical stroke – length, smoothness
- Rotation of the bone (patient's head)
- etc

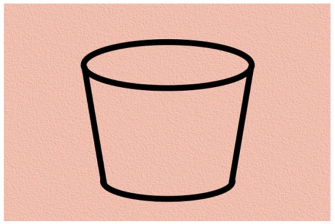
----- 15 records of 48 metrics generated per second -----

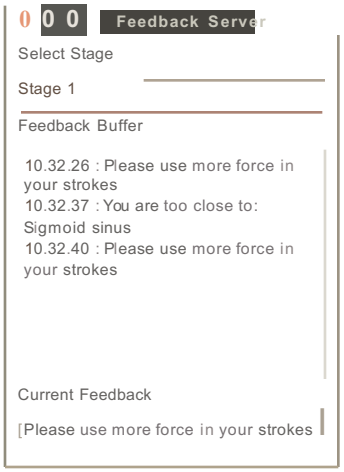
Mining Interactions for Feedback

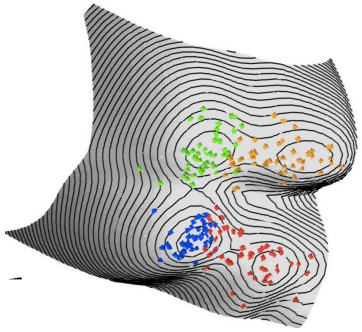
Model of
Novice Behaviour

Model of
Expert Behaviour

Mining Interactions for Feedback







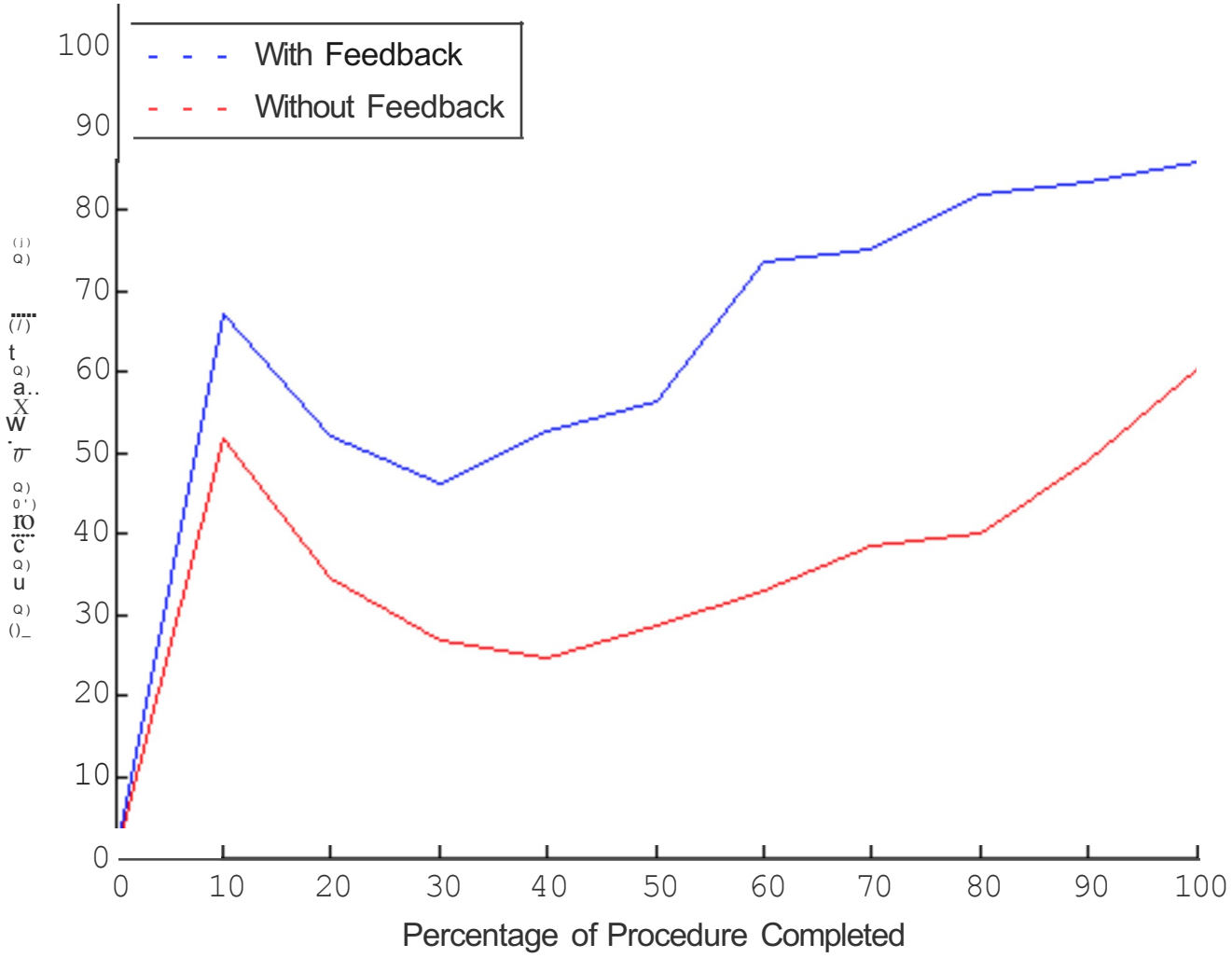
Feedback System Test

- 24 medical students
  - 12 were provided with automated feedback
  - 12 were not

- Knowledge of anatomy but not surgery;
  video tutorial of surgery and simulator familiarisation.

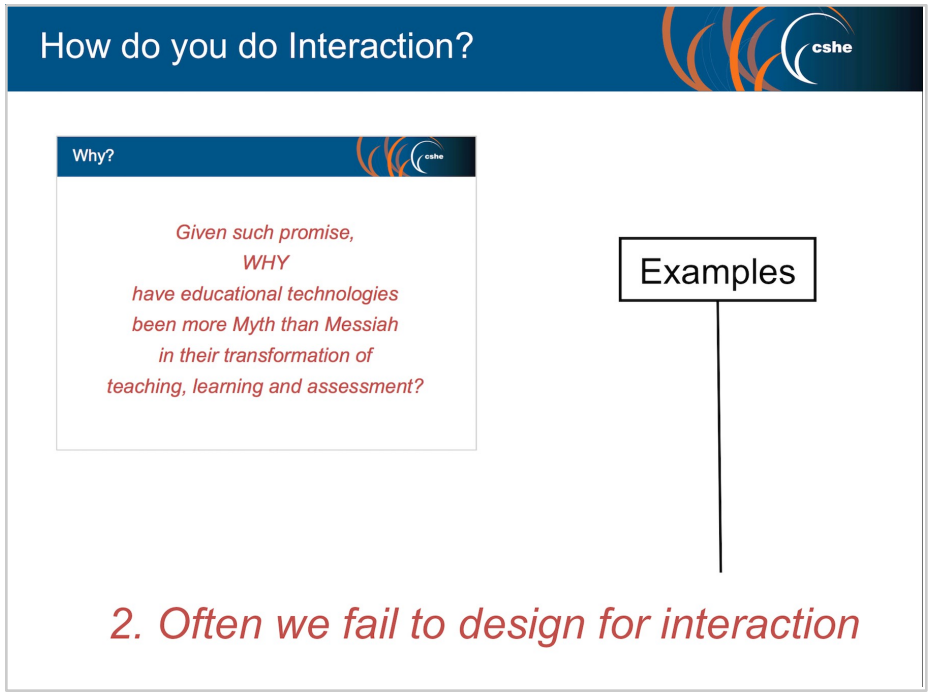
- Two group comparison of students' performance on a cortical mastoidectomy

Findings


With Feedback
Without Feedback
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Percentage of Procedure Completed

Designing for Interaction

Teacher-Learner	Learner-Learner	Learner-Content



Designing for Interaction

Teacher-Learner	Learner-Learner	Learner-Content

Cooperative

Case-based

Collaborative

Peer based

Communities of Practice

Authentic

Role Play

Simulation-based

Game-based

Situated

Discovery-based

Problem-based

Apprenticeship Model

Summary

1 Management and Administration of Teaching and Learning	3 Interactive Learning, Teaching and Assessment
2 Delivering and receiving electronic teaching and learning resources	4 Scholarly Inquiry and Research

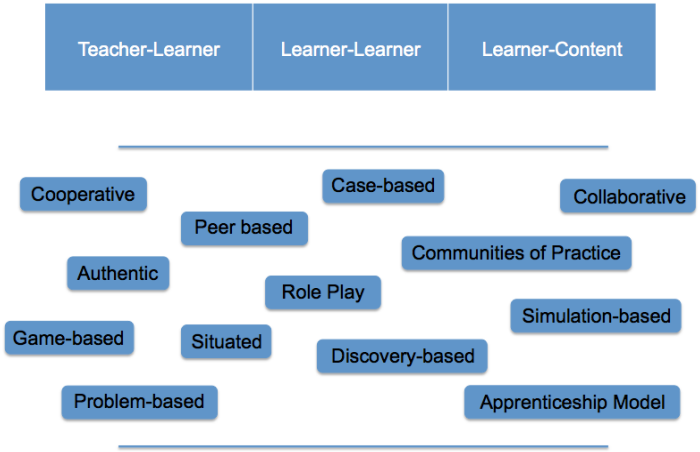
1.

"Educational" technology has a range of different roles and values.

Universities have tended to focus on the use of technology to support access to and management of education.

We need to continually remind ourselves to focus on the use of technology to support genuine, generative teaching, learning and assessment activities.

Summary



2.

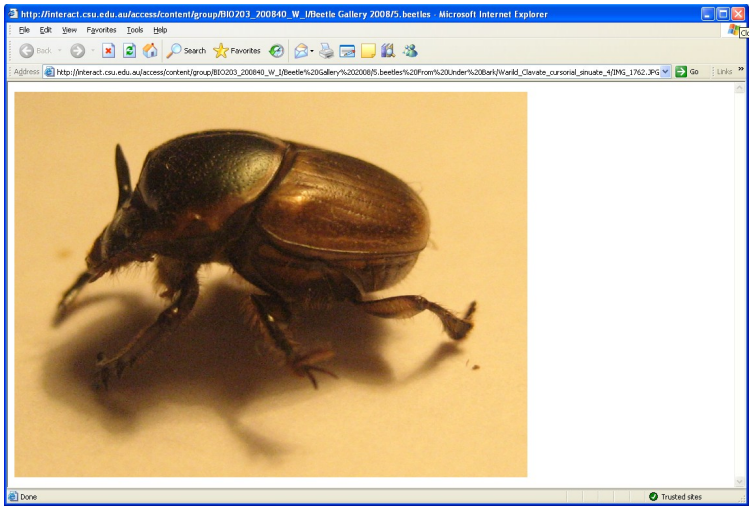
Learning Design is King.

The pedagogical design of our digital learning environments is the key to their success. Not the technology.

Meaningful interaction – between and among teachers, students and content – is critical.

There are well established learning design frameworks and models to draw on here.

Summary



3.

Constructive alignment is Queen.

The learning objectives, the design of the task or activity and the assessment need to be aligned.

Combining this idea with **2.**

= Biggs' (1996) notion of *Constructive Alignment*.

Summary

4.

With **2.** and **3.** in place, the technology recedes into the background.

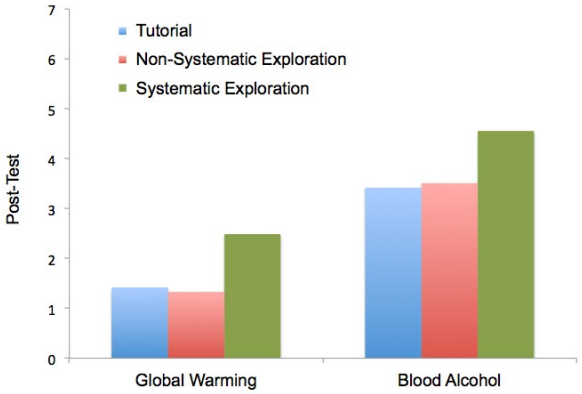
To put it another way …

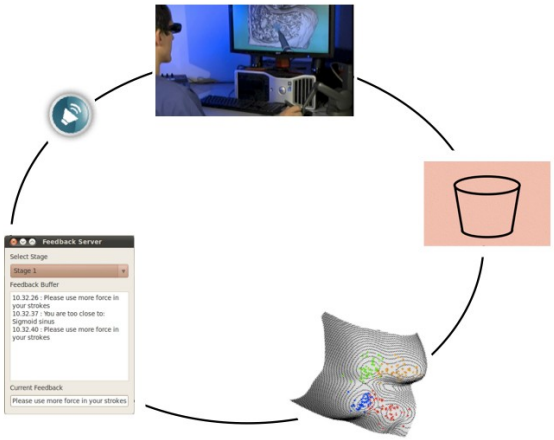
… you don't need super duper technology to create great digital learning environments.

or

Exceptional learning design can be enacted with modest technologies.

Summary





5.

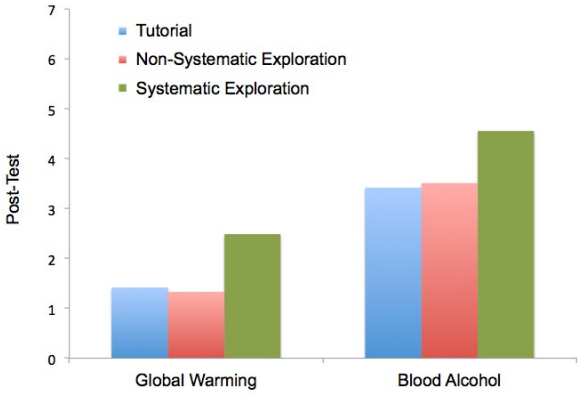
Learning Analytics – logging students' interactions – is a powerful tool.

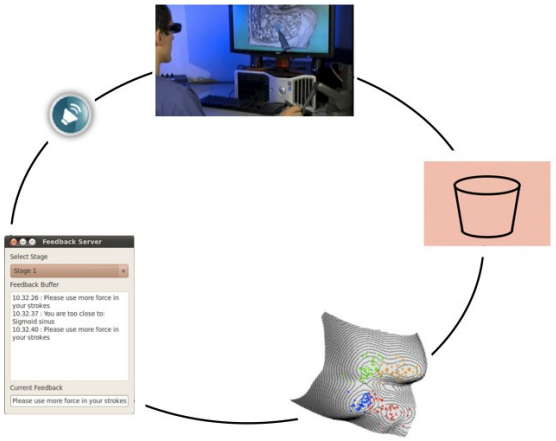
It can be used to show how students are interacting with, and within your digital learning environments.

So you can:

- intervene in the learning process;
- provide feedback about content;
- provide advice and support; and/or
- improve the learning design.

Summary





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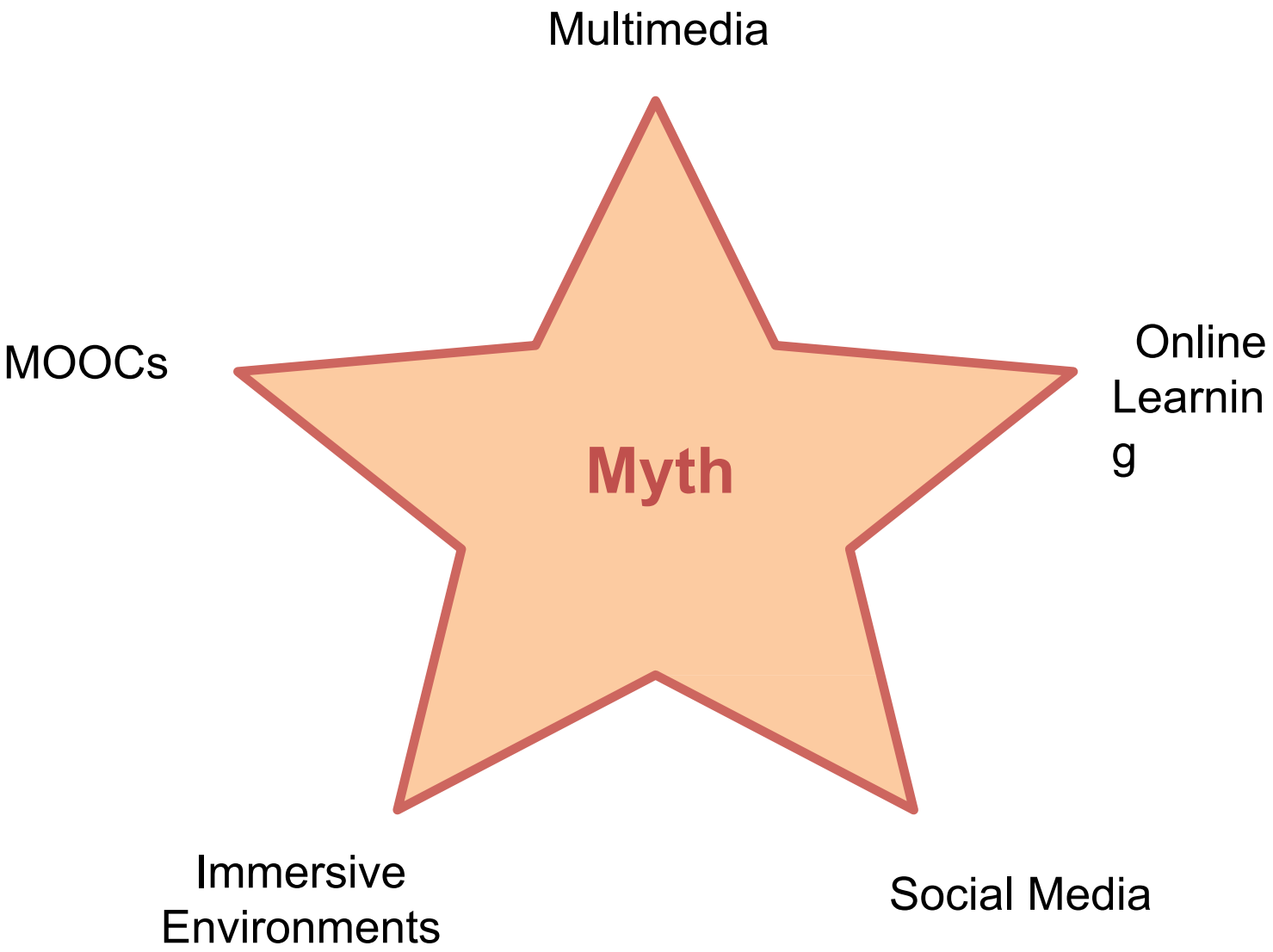
Conclusion

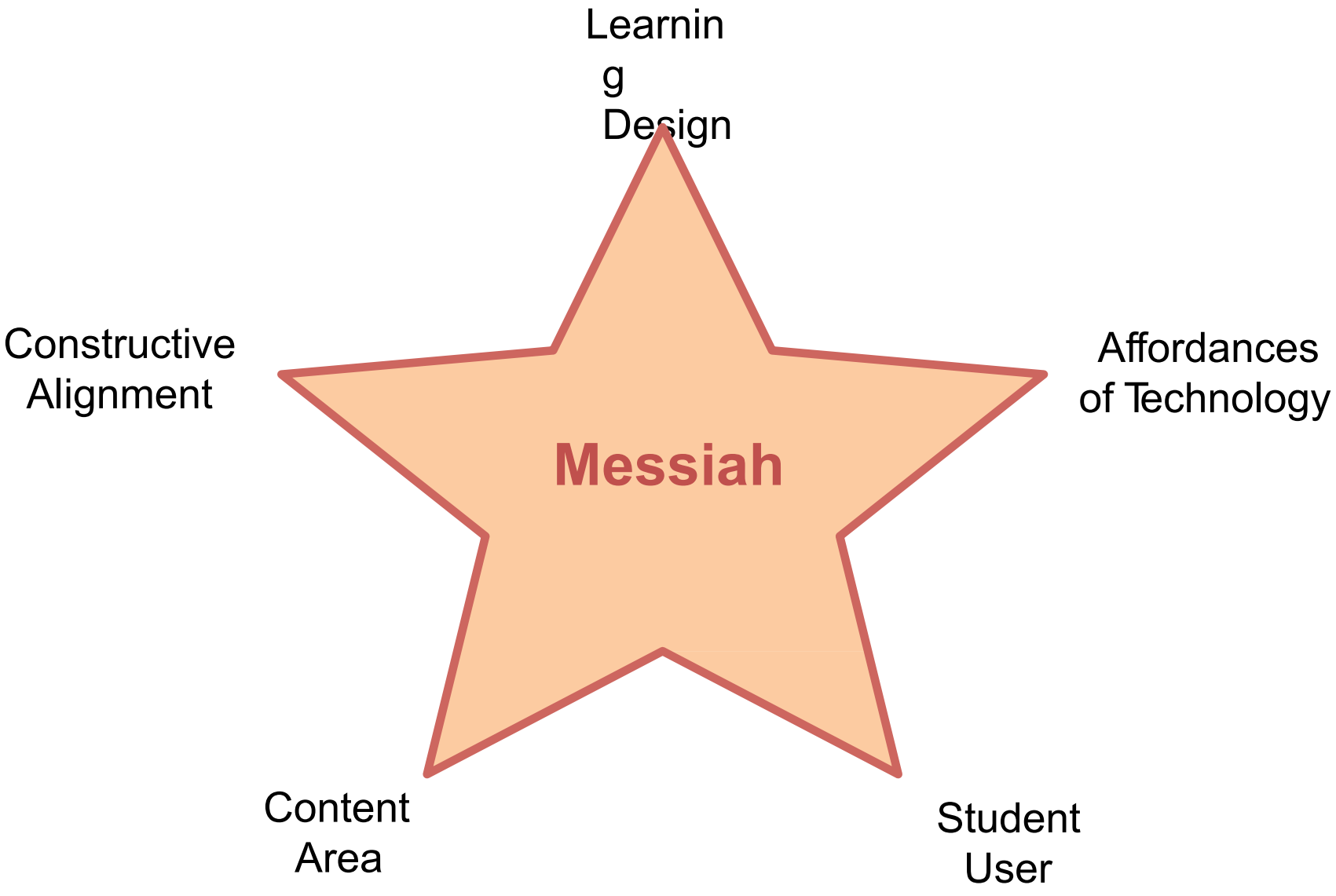
Messiah or Myth:
The core values
of
technology in university
education and learning

Professor Gregor Kennedy
Pro Vice-Chancellor, Educational Innovation
The University of Melbourne

Technology as Myth



Educational Technology as Messiah



Many Thanks

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