

 DESIGNS
for LEARNING

An emerging learning design based on analogical reasoning

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Prospective teachers as learning design authors: **Background**

- **What are learning designs?**

Coordinated, web-based learning sequence that makes accessible effective learning strategies, supported by appropriate structures and resources to provide guidance and feedback to learners (Oliver & Herrington, 2003).


- **What research exists on teachers designing and enacting their own learning designs?**

Research into how teachers might adapt and use LDs is in its infancy.
Eg. Cameron (2007); Dennis (2007); Earp & Pozzi (2006); Gibbs and Philip (2005); Griffiths & Blat (2005); Lam, Au Yeung & McNaught (2007)

New focus on associated pedagogical and procedural issues.

- **How/where did participants use their leaning designs?**

'Lesson component' and typically comprised a 20-30 minute online learning activity to be used with students during their practicum.



Prospective teachers as learning design authors: **The Study**

Primary research question:

How do pre-service teachers' authoring and use of contextualised online LDs enhance their development as teachers?

Subsidiary questions:

To what extent do pre-service teachers develop knowledge of (online and face to face) teaching and learning?

To what extent is their understanding of specific learning strategies enhanced?

What were the pre-service teachers' perceptions of LAMS as a teaching tool?

Prospective teachers as learning design authors: **The Study**

Approach:

Qualitative case study over two University semesters (2006)

Participants:

17 pre-service teachers from UTS formed the collective case

10 students were in their final year of the Bachelor of Education (Primary)
7 students were completing a Graduate Diploma in Education (Secondary).

Learning Design Authoring tool:

Learner Activity Management System (LAMS) (version 1.0)



Prospective teachers as learning design authors. **The Study**

Phase	Activity	Data collection
1	Familiarisation with LAMS and learning strategies	initial survey e-Journals
2	Design learning activity	e-Journals informal interviews written rationale
3	Implement learning activity NB. Most participants chose to implement their tasks in a f2f, school-based setting	e-Journals observations informal post-lesson interviews
4	Reflection on process and learning	final focus group interviews final survey evaluation of LAMS artefacts

Prospective teachers as learning design authors. **The Study**

(Well-researched) Learning Strategies used to underpin Learning Design

* ***analogical reasoning (AR) strategy*** (Harrison & Treagust, 2006).

This strategy supports learners' use of a familiar analogue to explore a 'target' concept.

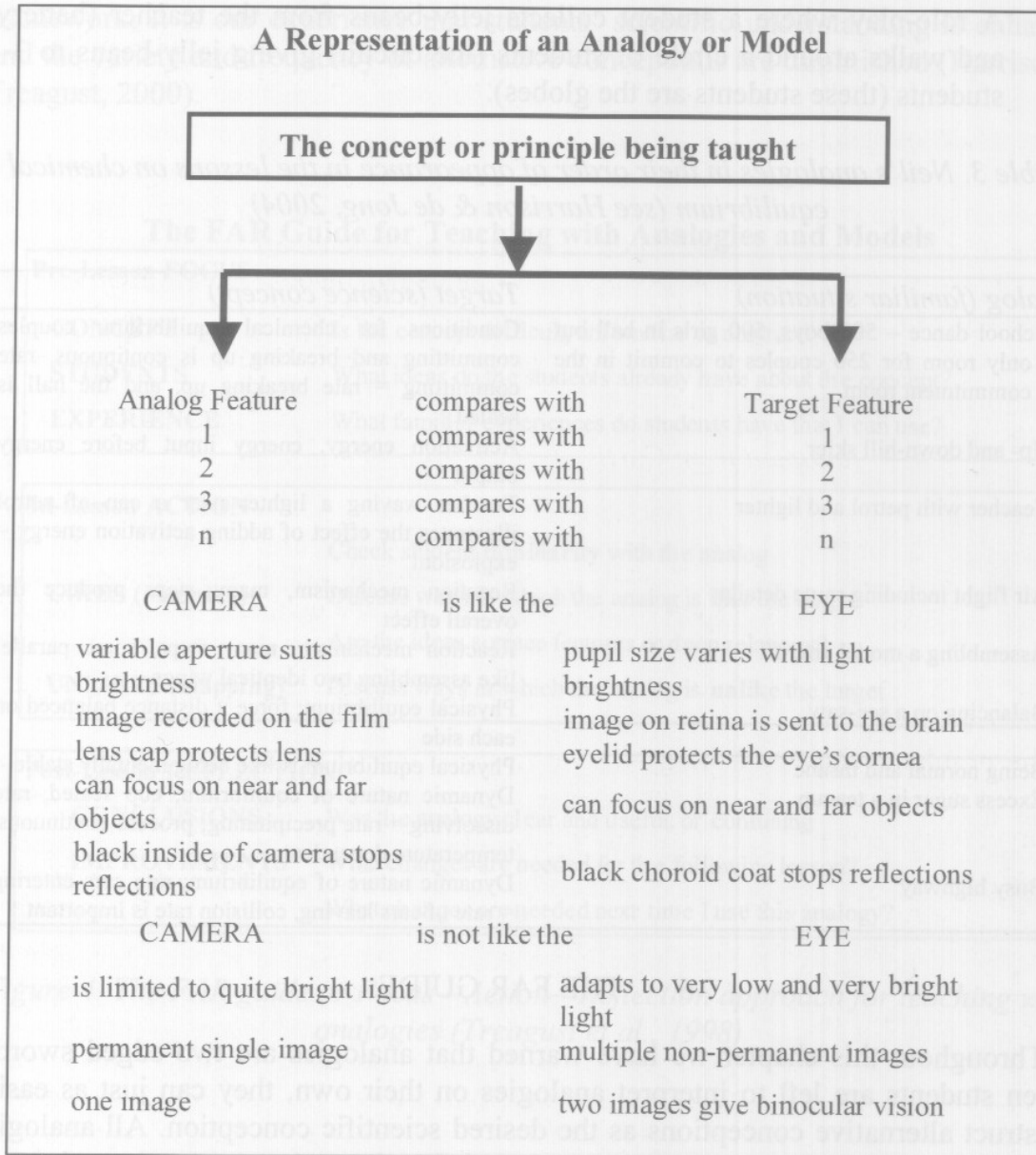
predict–observe–explain (POE) strategy (White & Gunstone, 1992)

This strategy scaffolds students' engagement with key demonstrations as stimuli for their learning.

learners' questions (LQ) approach (from the (broader)'interactive teaching' model - Biddulph, 1990) (e.g. see Baird & Northfield, 1995, p.240).

This approach elicits learner questions as a basis for further investigations.





The FAR Guide for Teaching with Analogies and Models

Pre-Lesson FOCUS

CONCEPT	Is the concept difficult, unfamiliar or abstract?
STUDENTS	What ideas do the students already have about the concept?
EXPERIENCE	What familiar experiences do students have that I can use?

In-Lesson ACTION

	Check student familiarity with the analog
LIKES (mapping)	Discuss ways in which the analog is like the target Are the ideas surface features or deep relations?
UNLIKES (mapping)	Discuss ways in which the analog is unlike the target

Post-Lesson REFLECTION

CONCLUSIONS	Was the analogy clear and useful, or confusing
IMPROVEMENTS	What changes are needed for the following lesson? What changes are needed next time I use this analogy?

An emerging learning design. **Model / Prototype**

Sample *specific contextualised* Analogical Reasoning Task:
Exploring Wave Properties (target)



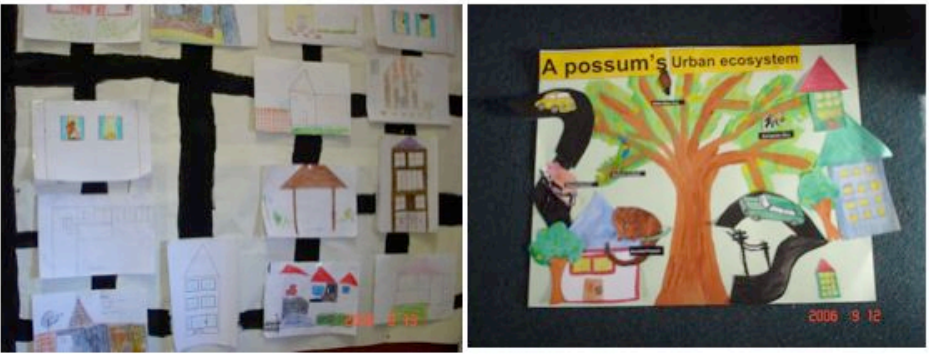
An emerging learning design: **STUDENT TEACHER SAMPLE**

http://uts-ed.lamsinternational.com - Learner : LAMS

Noticeboard [HELP]

Welcome

Hi guys! The purpose of this activity is to use your knowledge about your own human habitat and ecosystem to be able to further extend your knowledge about a possum's habitat and ecosystem.



Instructions

1. You are to complete this activity working in pairs

Transferring data from uts-ed.lamsinternational.com

http://uts-ed.lamsinternational.com - Learner : LAMS

LAMS Resume Exit

Available sequences

Progress

- Human habitat Q & A
- Possum habitat pics
- Natural Possum habit
- HumanPossumhab
- differenceposshuman
- samepossumhumanhab
- HTML Noticeboard
- diffpossnaturalurban

Notebook

Title

Question and Answer [HELP]

Question and answer

How is a possum's habitat different to our own human habitat?

Finished

http://uts-ed.lamsinternational.com - Learner : LAMS

LAMS Resume Exit

Available sequences

Progress

- Possum habitat pics
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- HumanPossumhab
- differenceposshuman
- samepossumhumanhab
- HTML Noticeboard
- diffpossnaturalurban
- naturalpossurbanecos

Notebook

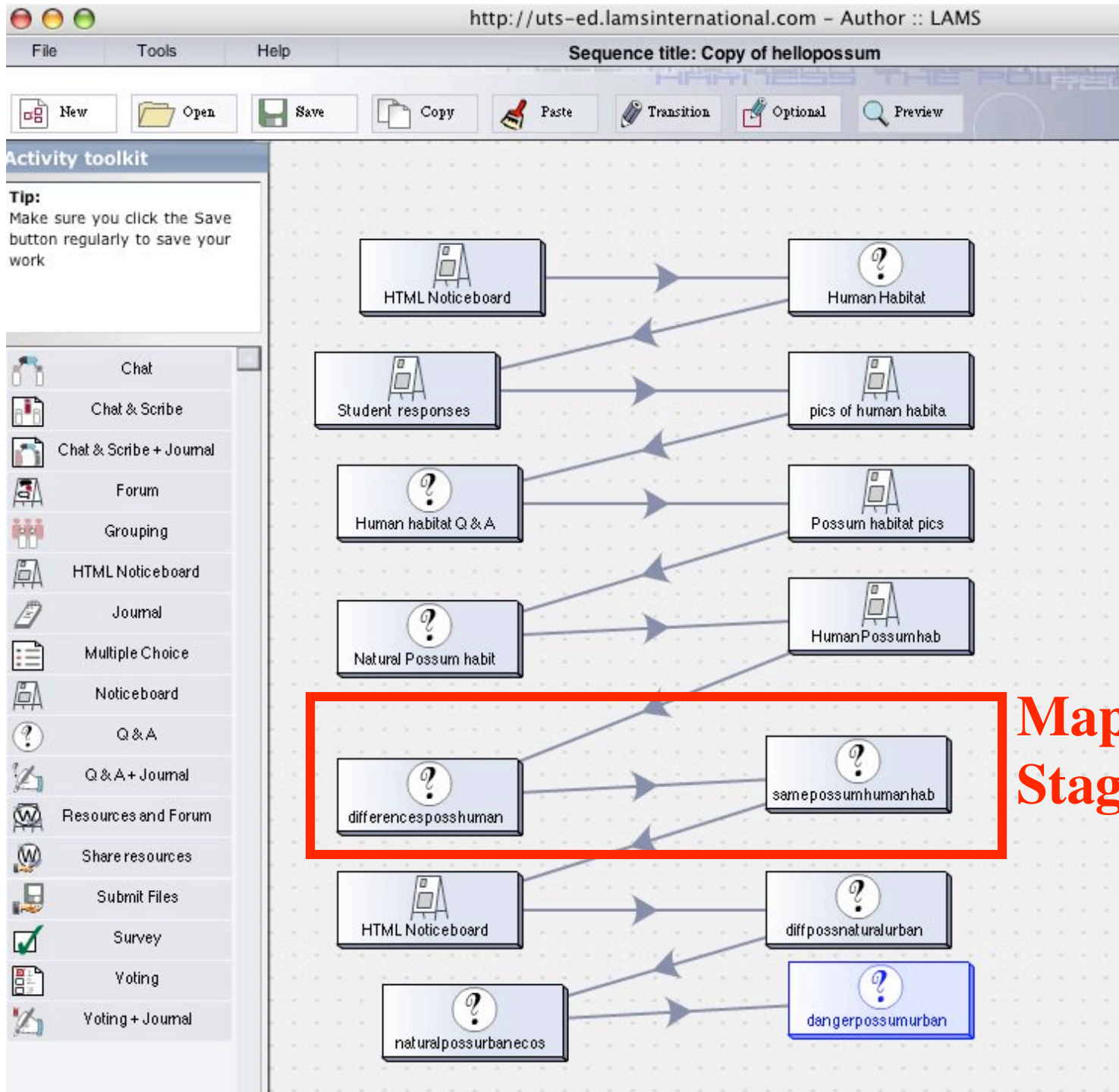
Title

Question and Answer [HELP]

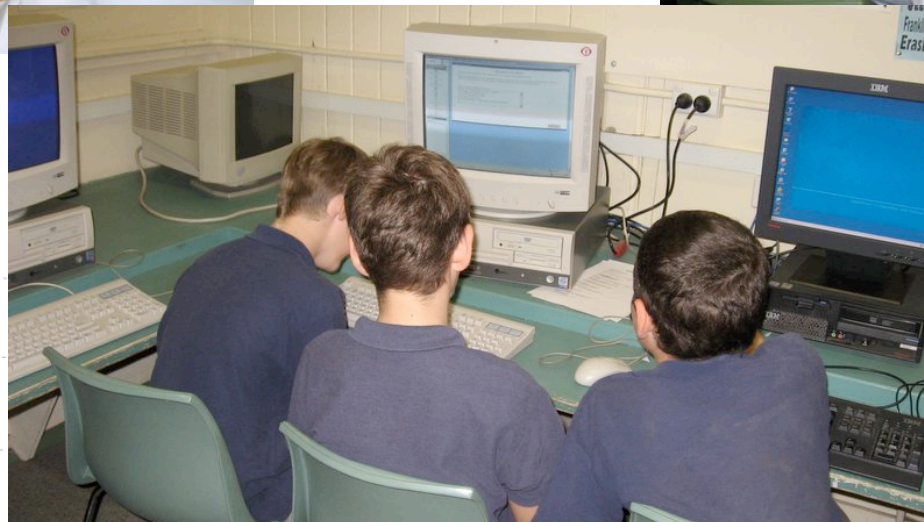
Question and answer

How is a possums habitat similar to our own human habitat?

Finished



An emerging learning design: **Field Tests**



An emerging learning design: **Emerging Generic Learning Design**

A beta generic learning design *based on analogical reasoning* has emerged through an iterative cycle of :

- consultation with the literature;
- critical collaborative reflection amongst subject and pedagogical experts;
- 'field tests' with pre-service teachers and their students.



Analogical Reasoning (beta) Learning Design Sequence



Learning outcomes

- Develop understanding of target concept through articulation and justification of ideas; reflection on the viability of others' ideas; critical reflection of own ideas and negotiation and construction of modified and new ideas.
- Develop science discourse skills

An emerging learning design: **Further Extensions**

- inclusion of student work (as informed by Eleanor's task);
- use of follow-up information, tutorials etc. (after step 8);
- use of *student-generated analogies* (eg. in a similar way to Lisa's task;
- use of *student-generated* or *teacher-student* or *co-generated* role-plays (as analogies)

An emerging learning design: **Future Directions**

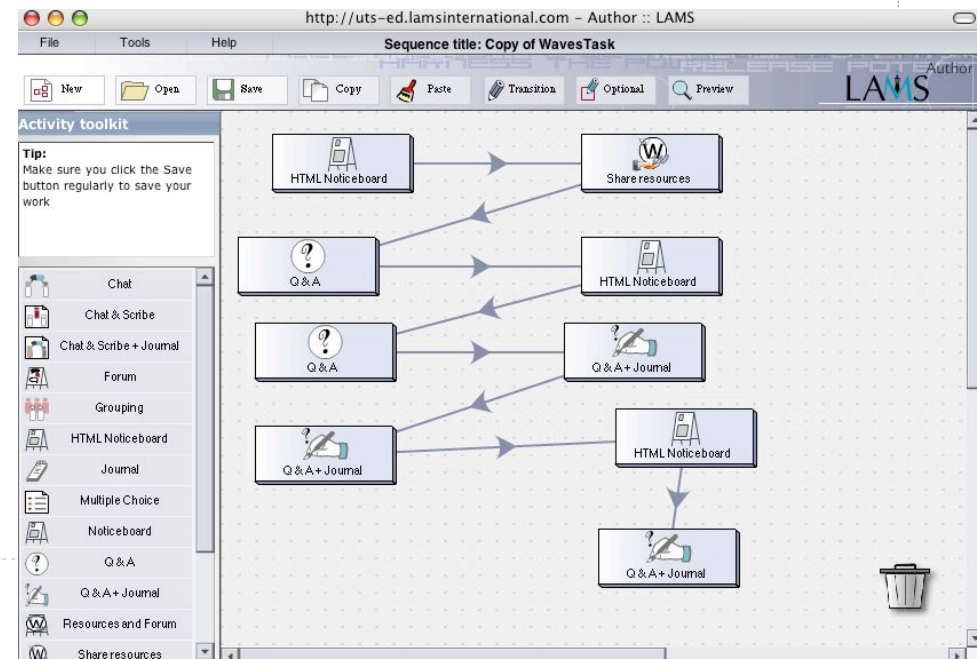
A. Further *evaluation and development*:

- role of pre-service and practising teachers
- feedback from LAMS community
- further consultation with subject and pedagogical experts

B. LAMS-based *e-Templates* & associated teaching notes

(suggestions - not prescriptive/ 'plug&play'!)

C. Other generic learning designs informed by well-researched classroom learning procedures ?? (e.g. see Baird & Northfield, 1995)



Prospective teachers as learning design authors: **Findings (reported elsewhere)**

Pre-service teachers' developed understanding of online and face to face teaching issues

- (a) Unit planning and programming insights
- (b) Promoting learning in a web-based environment
- (c) Classroom strategies to facilitate online learning

Pre-service teachers' developed understanding & value of specific learning strategies

Understanding of Analogical reasoning,
POE strategies etc.

This project has really made me realise how hard it is to **use analogies** well in the classroom and how important it is to get students involved in creating them and talking about what the differences are.

(Lucy, interview)



An emerging learning design: **Discussion Point**



It's hard for students to have input in the direction the task takes ... There is not as much room for lateral movement in the task. (Lucy, final survey)

They [the students] get no choice in the sequence of events, nor a chance to investigate any misunderstood concept any further than the information presented to them. The program seems to speak to them, but cannot read their answers/responses and adapt the following sequence accordingly like a teacher could. (Eleanor, focus group)

I have found that such [LAMS] activities need to ... be designed to guide, but not excessively constrain, the students' exploration... promoting lines of inquiry that help students develop their understanding of the important concepts. (Anna, rationale)

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Other papers

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<http://lamsfoundation.org/lams2007/papers.htm>