Expo 2010:
Teaching and Learning Innovation

Authentic learning designs:
Creating engaging real-world tasks

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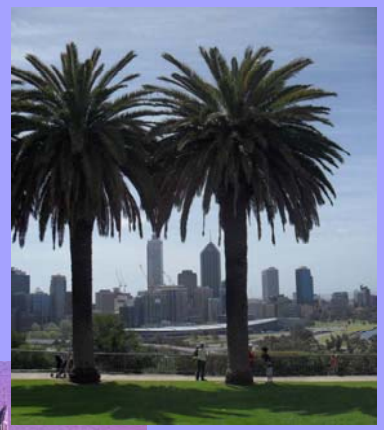
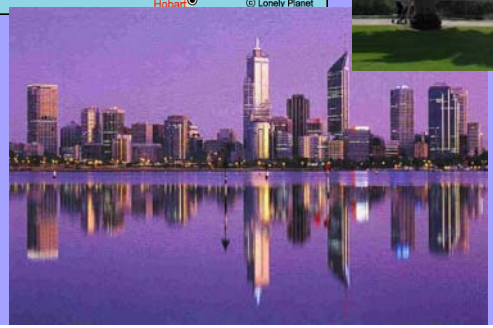
Murdoch University
Western Australia

22 October, 2010
Chinese University of Hong Kong

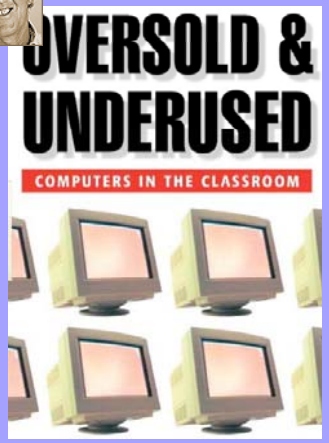




Technology without pedagogy

The facts are clear … powerful technologies end up being used most often for word processing and low-end applications in [education]…

After all the machines, money and promises, the results are meager.

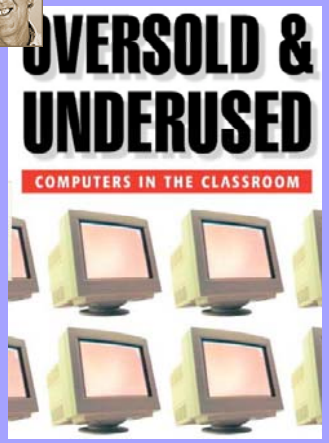


Technology without pedagogy

Banks of computers in classrooms remain unused

Mobile devices are turned off

Laptops are used only for low level activities



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http://obviousmag.org/en/archives/2009/04/alternative_uses_for_your_laptop.html

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http://obviousmag.org/en/archives/2009/04/alternative_uses_for_your_laptop.html

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9 elements of authentic learning

(Herrington, Reeves & Oliver, 2010)

- Authentic context
- Authentic activity
- Expert performances
- Multiple perspectives
- Collaboration
- Reflection
- Articulation
- Coaching and scaffolding
- Authentic assessment

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Learning WITH technology

We can use pedagogical models such as authentic learning to guide the successful use of educational technologies

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Authentic context

Authentic context
Authentic task
Expert performance
Multiple views
Collaboration
Articulation
Reflection
Scaffolding
Authentic assessment

- A physical or virtual environment that reflects the way the knowledge will be used in real-life

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Authentic learning

What is it?

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Authentic tasks

- Authentic context
- **Authentic tasks**
- Expert performance
- Multiple views
- Collaboration
- Articulation
- Reflection
- Scaffolding
- Authentic assessment

- Tasks and activities that have real-world relevance

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Authentic context

Characteristics

- A design to preserve the complexity of the real-life setting
- Provides the purpose and motivation for learning
- Ideas can be explored at length in the context of real situations

Example: Sustainable tourism

Appalachian Grower's Fair:
46 hospitality and tourism students

- Plan, market, conduct and evaluate a festival
- Showcase local produce, plants, handmade items and music
- Fund a proposed museum at the site

(Deale et al. 2010)

Complex scenarios

Real world problems

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Authentic tasks

Characteristics

- Clear goals and real-world relevance
- Require production of knowledge rather than reproduction
- Complex and ill-defined
- Completed over a longer period

Example: History

Becoming an historian

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Authentic context

Characteristics

- A design to preserve the complexity of the real-life setting
- Provides the purpose and motivation for learning
- Ideas can be explored at length in the context of real situations

Example: Sustainable tourism

Appalachian Grower's Fair:
46 hospitality and tourism students

Use internet, cameras, computers, mobile phones, software to design, plan, market, collect data, interview …

Complex scenarios

Real world problems

'Not Just A Name On A Wall'

Home Research Task Memorial Resources Teacher Info

Research (Finding Information)

Once you have chosen a name from a memorial such as the Coonabarabran Clock Tower, you need to find out as much as you can about the person and their experiences in WW1. Write rough notes to begin with using the Scaffold to help arrange them in order. There is a huge amount of written material available on the web concerning WW1. One reliable suggestion for your research is to:

Start with the Biographical section of the Australian War Memorial Website. Click on the 'Research a Person' link and enter any relevant information. You may obtain an array of records, but you are guaranteed to at least obtain an entry on the nominal roll (a photographed sheet from which you identify your soldier). This will give you amongst other information his unit and enlistment and discharge dates. The AWM site has a wealth of information on WW1 and you may wish to investigate other sections, such as the Australians at War Section

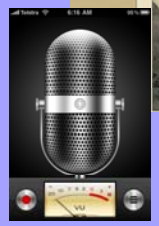
Once you have the soldiers unit (such as his battalion), and relevant dates you can track his experiences through following his unit through the War. A battalion of infantry is made up of around 1000 men and it is reasonable to assume that your soldier shared a common experience with these men.Next go to Ross Mallet's Order of Battle site as it has comprehensive information on every unit that served in WW1. Make a list of the Battle Honours for your unit, and that, together with the enlistment and discharge dates will show what your soldier was involved in. Mallet also has a link to unit histories which you may be able to obtain through your library or view at the Mitchell Library.

Next find out some detail about some of the battles the soldier may have participated in. One suggestion to to refer to the Australian Battlefields of WW1 site. Another suggestion would be to download and look at the appropriate section of the Bean's First World War Official History available on the AWM site.

This page on the National Archives of Australia site gives instructions for searching for information using RecordSearch. If you are fortunate the soldier's Service Record will have been digitised for you to view (you can request a photocopy but will need to pay for it). The service record usually has an Attestation Paper, Service and Casualty Form and any Military Correspondence. These can be extremely valuable to obtain a mental picture of the soldier and to track his movements. As well a hospital admission dates, the Service and Casualty Form includes leave details, any AWOL and some information on movements.

Example: History

- Course: Year 10 History - World War 1
- Peter Morrissey, Coonabarabran High School



Use mobile phone to interview and take photographs

Expert performance

- Authentic context
- Authentic task
- **Expert performance**
- Multiple views
- Collaboration
- Articulation
- Reflection
- Scaffolding
- Authentic assessment

- Access to expert thinking and the modelling of processes

'Not Just A Name On A Wall'

Home Research Task Memorial Resources Teacher Info

Coonabarabran Memorial Clock Tower

The Coonabarabran Memorial Clock Tower would be familiar to any traveller along the Newell Highway between Brisbane and Melbourne. It is built from local sandstone and was dedicated in 1928. The tower has a large brass plaque on each side inscribed with the names of 255 servicemen that served in The Great War (WW1). Those that died during the war (41) have a star next to their name. These names can be read by clicking on the icon of each plaque below. This will open an enlarged image of the plaque.


Dedication Plaque on East Wall


Names on South Wall


Names on West Wall


Names on North Wall

Multiple perspectives

Characteristics

- Not just a single perspective - such as a textbook
- Powerful search tools enable range of views
- Different points of view on a critical incident

Example: Investigate a workplace accident

Repositories and resources

Powerful search engines

Expert performance

Characteristics

- Access to the way an expert would think and act
- Access to learners in various levels of expertise
- Opportunities for the sharing of narratives and stories

Examples: Expert views

Access expert opinion

Podcasts and vodcasts

Collaboration

- Authentic context
- Authentic task
- Expert performance
- Multiple views
- **Collaboration**
- Articulation
- Reflection
- Scaffolding
- Authentic assessment

Joint problem solving and social support

Multiple perspectives

- Authentic context
- Authentic task
- Expert performance
- **Multiple perspectives**
- Collaboration
- Articulation
- Reflection
- Scaffolding
- Authentic assessment

- Different perspectives from different points of view

Articulation

- Authentic context
- Authentic task
- Expert performance
- Multiple views
- Collaboration
- **Articulation**
- Reflection
- Scaffolding
- Authentic assessment

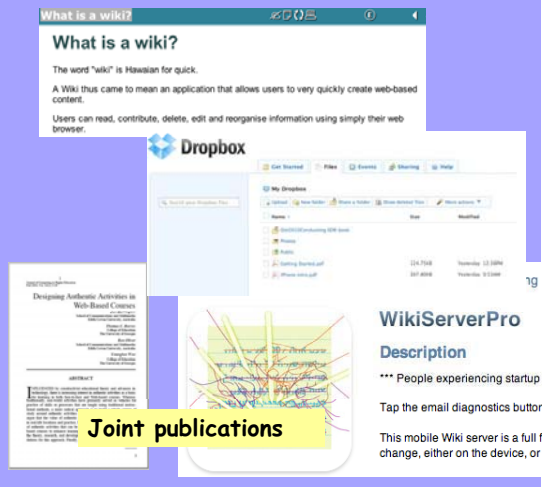
Opportunities for students to speak and write about their growing understanding

Collaboration

Characteristics

- Teams or pairs rather than individuals
- Collaboration encouraged through technology
- Tasks addressed to groups, not individuals

Examples: Collaborative writing online

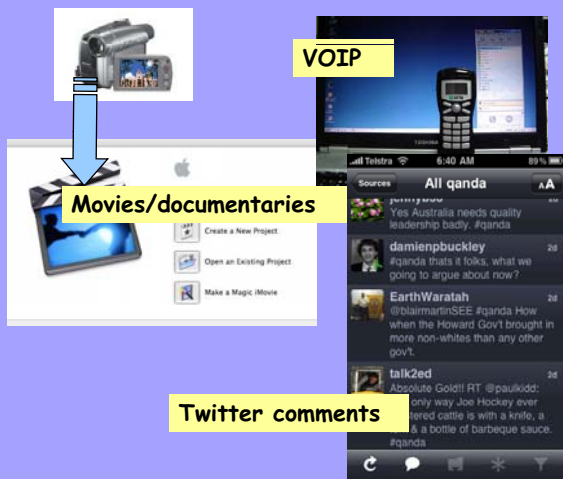


Articulation

Characteristics

- Public presentation of argument to enable defence of position and ideas
- Presentations to online class
- Microblogging articulation in 140 characters

Examples



Example: Negotiation skills

- Course: Management - Employment relations
- Delicate dining
- Sandra Jones, RMIT, Melbourne

Students have roles as a manager, chef, kitchen hand, waiting staff, bar staff, and address contemporary issues facing the organization and the role-player

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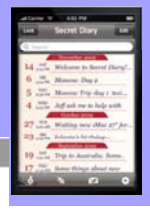
Reflection (*in* and *on* action)

Characteristics

- Opportunities to make choices
- Not quiet and solitary - can be a two-way process
- Opportunities to reflect in online and mobile journals and diaries

Examples

Blogs



Journals and diaries

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Articulation

- What causes the phases of the moon?
- What causes the seasons?
- What is evaporation?
- How do you read a weather map?

Students create a film to teach other students a scientific concept, including:

- Diagrams
- Interviews
- Music,
- Animations etc.

In order to explain it to others they must understand it and be able to articulate the concepts

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Scaffolding and coaching

- Authentic context
- Authentic task
- Expert performance
- Multiple views
- Collaboration
- Articulation
- Reflection
- **Scaffolding**
- Authentic assessment

- Support provided to the learner by the teacher and others in the learning environment

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Reflection

- Authentic context
- Authentic task
- Expert performance
- Multiple views
- Collaboration
- Articulation
- **Reflection**
- Scaffolding
- Authentic assessment

- Opportunity to think about, reflect and discuss choices

Authentic assessment

Characteristics

- Seamless integration of assessment and task
- Opportunities to craft polished performances
- Significant student time and effort in collaboration with others

Example: Portfolios and authentic products

Scaffolding

Characteristics

- No attempt to 'transmit' knowledge
- Teacher's role is supporting rather than didactic
- Collaboration where more able partners can assist

Example: Twitter in large lecture

Focusing on the task

It's the task that matters most!

Tom Reeves

Authentic assessment

- Authentic context
- Authentic task
- Expert performance
- Multiple views
- Collaboration
- Articulation
- Reflection
- Scaffolding

Authentic assessment

- Assessment is integrated with the task rather than separate testing

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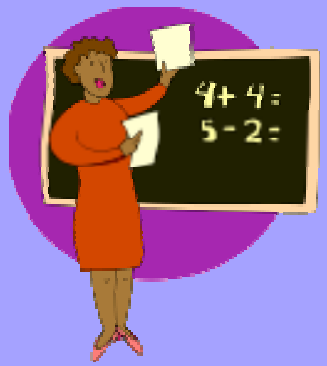
Is this an authentic task?

There are 25 people in a room. How many handshakes would there be, if everyone shook hands with every other person?



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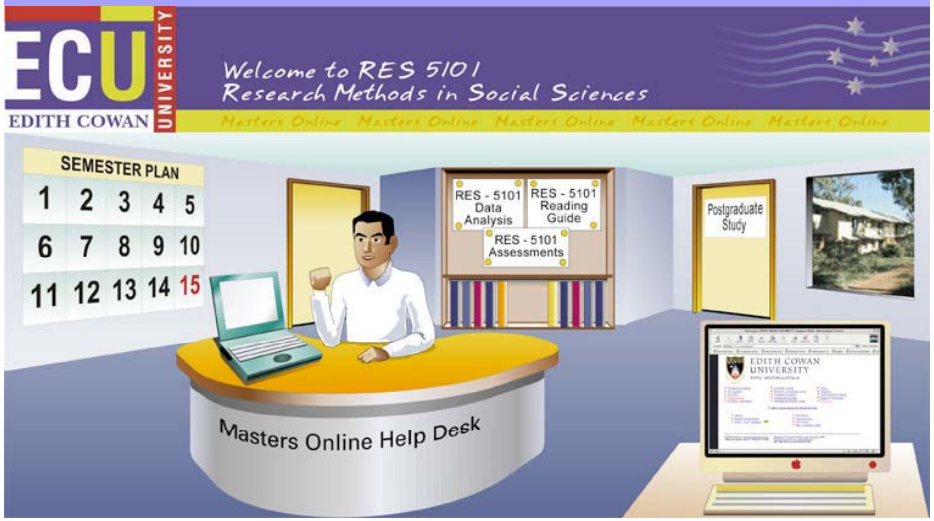
E-learning works when the learning tasks are authentic!



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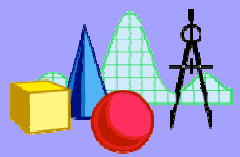
Decontextualized problems

Let F be the vector field on given by $F(x,y,z) = (2xz, -x, y^2)$
Evaluate

where V is the region bounded by the surfaces
$x = 0$, $y = 0$, $y = 6$, $z = x^2$ and $z = 4$



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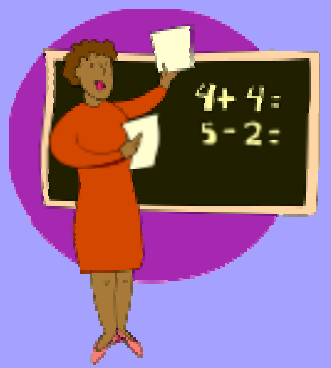
What is an authentic task?

a. $2x + 1 = 7$
   Solve for x
b. $1/2 + 3/4 =$
c. Graph
   $y=\sin 2x$



Problems that try to relate to students' interests

Teachers' joke adds up to woe (West Australian)

DALLAS

SIX high school mathematics teachers in a United States school have been suspended for giving their students a quiz that used real-life situations involving drugs, prostitutes and violence to test their skills.

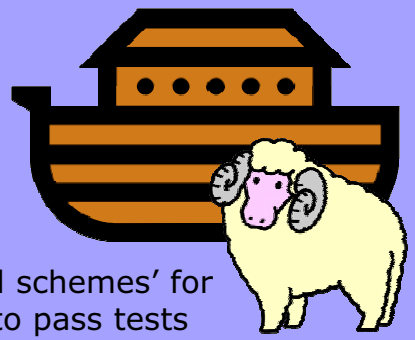
The controversial worksheet included these questions:

• Johnny has an AK-47 with an 80-round clip. If he misses six out of 10 shots and fires 13 times at each drive-by shooting, how many drive-by shootings can he attempt before he has to reload?

Word problems

If there are 26 sheep and 10 goats on a ship, how old is the captain?

Schoenfeld (1991) "nonreason" - a willingness to engage in activities that don't make sense



Collins (1988): 'suboptimal schemes' for remembering information to pass tests

Real-life examples

Teachers' joke adds up to woe (West Australian)

The six teachers have apologised over the test.

"It was intended as an icebreaker, of letting kids know know that we have a sense of humour and a sense of what goes on in the world".

It was not known how the students scored in the test.

Word problems

Problem:

If a person jumps off a moving bus, how would that affect the speed of the bus?

"It depends on what the driver does"

"It depends on whether the other passengers notice"

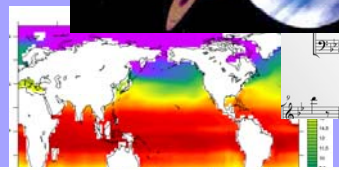
"It depends on how heavy the person is"

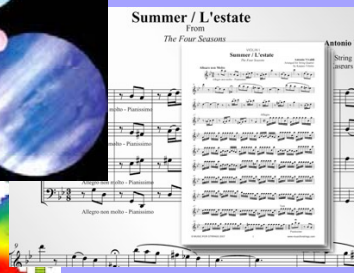
"It depends on whether anyone cares about the person "

Thematic approaches

The four seasons

- Science
- Music
- Poetry/writing
- Mathematics
- Geography

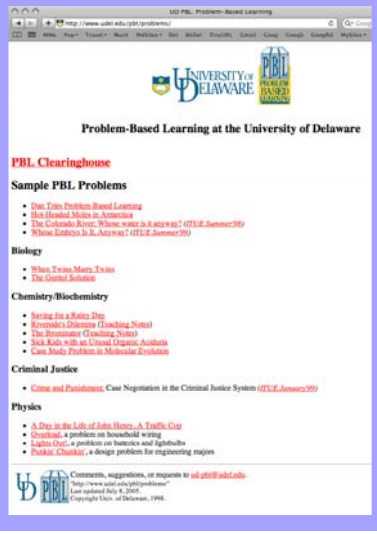




Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature												
Mean maximum temperature (°C)	25.6	25.6	24.5	22.6	20.0	17.6	17.0	18.3	20.3	22.1	22.9	25.0
Mean minimum temperature (°C)	17.9	18.2	16.7	14.2	11.8	9.4	8.3	8.8	10.6	12.6	14.4	16.5

Some PBL problems

- Problem-based learning example
- When Twins Marry Twins



Most video games

- Most games do not require a product

When Twins Marry Twins
Written by Deborah E. Allen

Sally Thompson meets Harry Branaugh in her junior year at a small liberal arts college in Massachusetts. It's a case of love at first sight. In the spring of their senior year, they both have been lucky enough to find jobs in the Boston area, so they plan to get married in the June following graduation.

At their wedding rehearsal dinner, Sally's twin sister Emma meets Harry's twin brother Ken for the first time. It's a case of love at first sight. As Sally and Harry have their first serious argument about who should have told whom about having a twin (and exactly when), Emma and Ken make plans for the evening that don't include the rest of the family. Three months later, they also decide to get married.

The couples keep in touch, and 3 years later Sally and Emma are delighted to discover that they are both expecting (twins?). Emma's due date is in October, and Sally's in December. On December 12th, seventeen hours into labor, Sally is no longer sure she's delighted about the prospect of motherhood, and begins to worry about the child she's about to deliver.

"Why didn't you think of it sooner?" she says to Harry, gripping his arm rather severely. "Identical twins should never marry identical twins. Our child's going to look just like Emma and Ken's little boy." Her first impression of Kenneth, Jr. she recalls, was that he had the sort of face that only a mother and father could love.

Two hours later, Sally is scared to take a look as the obstetrical nurse puts her first child into her arms.

Questions to ponder:

Will their child look just like his or her "double cousin," Ken, Jr.? Why or why not?

Assuming that Sally is right and the children will look identical, will they also have similar personalities, behavior, and attitudes?

What is the maximum percent of the two childrens' genetic composition that could consist of identical genes (allelic versions)? The minimum percentage?

[This short problem was selected to represent the type of PBL problem that can be used successfully in a large class for non-majors as well as majors, can be researched by consulting the textbook alone, and has a content focus that easily fits within the framework of a conventional course.]

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Focusing on the task

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Complex problems simplified

Occupational Health and Safety

Virtual laboratory
(Quicktime VR)
Janis Mussett, Curtin Uni

Instead of a realistic product like OHS workplace evaluation

Task and assessment simplified as list of specific questions:

- What biological materials are present in the lab?
- What biological hazards are evident?
- How many instances of contamination exist in the lab?
- What preventive measures should be in place?

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What are authentic tasks?

- have real-world relevance
- are ill-defined
- comprise a complex task to be investigated by students over a sustained period of time
- provide the opportunity for students to examine the task from different perspectives, using a variety of resources
- provide the opportunity to collaborate

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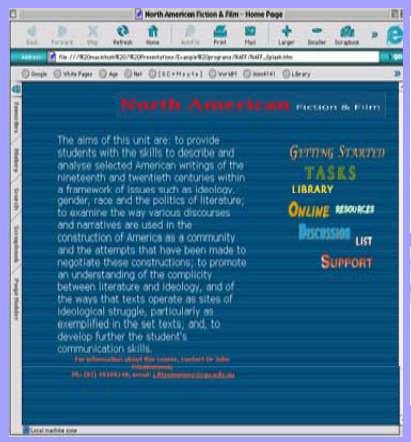
What are authentic tasks?

- If none of these examples qualify as authentic tasks, what do?
- What are the characteristics of authentic tasks?

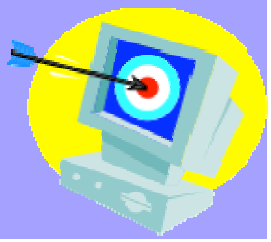
Example: Literature

- Course: North American Fiction and Film
- John Fitzsimmons Faculty of Arts Health and Sciences, Central Queensland University



Authentic tasks:

- provide the opportunity to reflect
- can be integrated and applied across different subject areas
- are seamlessly integrated with the assessment
- create polished products valuable in their own right
- allow competing solutions and diversity of outcome



Example: IT in education

- 1st year teacher education compulsory IT subject
- One major task over 7 weeks

Example: Research methods

- Course: Research preparation: Research methods
- Max Angus & Jan Gray, School of Education, Edith Cowan University

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The effect **of this approach?**

- Transitory learning
- Lack of transfer
- Or worse!

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How IT is often taught in teacher education …

- We teach **from** technologies or **about** technologies
- Not learning **with** technologies

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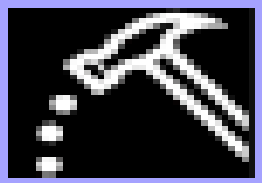
Technology as cognitive tools

"Teach carpentry not hammer"

(Oppenheimer, 1997)



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A typical introductory teacher education course

- How to make a Powerpoint presentation
- How to create a web page
- How to create a spreadsheet

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The task

- 7 weeks in a 13 week semester
- Technology available to students:
  - iPods and microphones (1 x iPod per group of 2-3 students)
  - Video and still cameras - students used their own
  - Computers and software required for story-book construction: (e.g., Powerpoint, GarageBand, iTunes, iMovie, iPhoto, Word, ComicLife)

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Approach

The approach of the project was to:

- use a central **authentic and complex task**
- encompass learning a range of different **technological tools**, and
- create **a genuine product** to share with other pre-service teachers and their own students
- **model processes** that primary school children could adopt

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Writing the story

- Children's author as guest speaker
- Research and choose topic
- Write and storyboard story

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Digital stories

Device

iPods

Curriculum/focus

IT for Early Childhood teachers

Task

Create a podcast of an original story - a talking book created in Powerpoint

This was certainly a project which had it all, tears and laughter, frustration and excitement and even a little swearing thrown in for free.

What a challenge, but what a great feeling of achievement we all feel now it's complete - well almost. We still need to transfer it on to the iPod and save it to Quicktime, but piece of cake right??

We faced a LOT of problems, but by asking people and through trial and error we came up with a solution.

Yes indeed, these tasks no longer scare me, because we have proved to ourselves that with a little trial and error, perseverance and a few tears, we can succeed.

This has been a really challenging assignment but I did learn things I had never even heard of before, I guess that was the idea!

Using the technologies

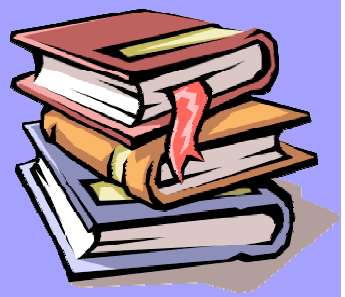
- Brainstorm story ideas in concept mapping software (e.g., Inspiration)
- Capture and create pictures and videos
- Create 'pages' of story, including animations and transitions (e.g., in Powerpoint)
- Record audio narration (using iPods with microphones), and insert music and sound effects (e.g., using iMovie)
- Create a podcast to enable sharing of stories:
  - Save as a .mov file
  - Publish as podcast

COGNITIVE TOOLS

Brainstorming ideas in **Inspiration**
Researching on **internet**
Creating story pages in **Powerpoint** **Creating movie** in **iMovie**
Inserting images Inserting **sounds**
Scanning drawings **Recording voiceovers**
Exporting files **Importing files** Adding **sound effects** Timing **slide advances**
Creating **movie files** **Uploading files** to server Publishing **podcasts**
Downloading other stories
Uploading files to **iPods**
Reflective journal as **blog** or **Word** document
Creating **pdfs**

Sharing

- Groups publish story to the course website.
- Students download each other's stories to put into their course portfolios and resources.
- Students present Powerpoint presentations in class, and submit stories on iPods for assessment
- Students create a reflective journal on the process and product (e.g., as podcast, blog, comic or webpage)



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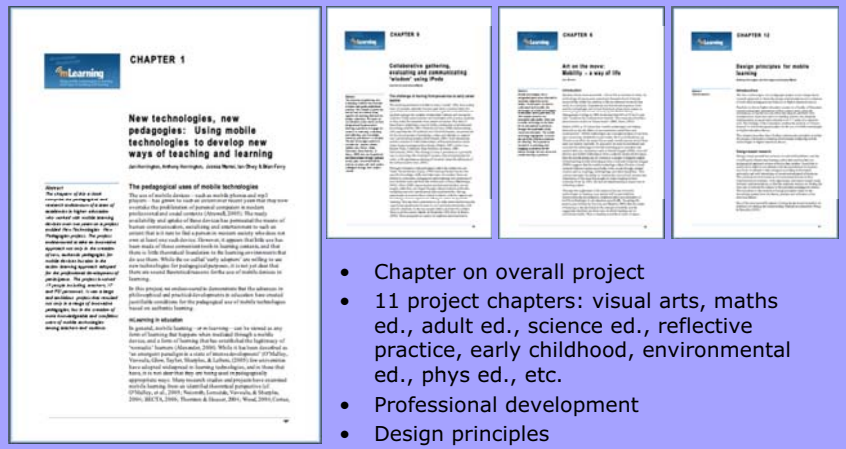
Dissemination: Online book



- Chapter on overall project
- 11 project chapters: visual arts, maths ed., adult ed., science ed., reflective practice, early childhood, environmental ed., phys ed., etc.
- Professional development
- Design principles

http://ro.uow.edu.au/newtech/

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Digital stories

Device

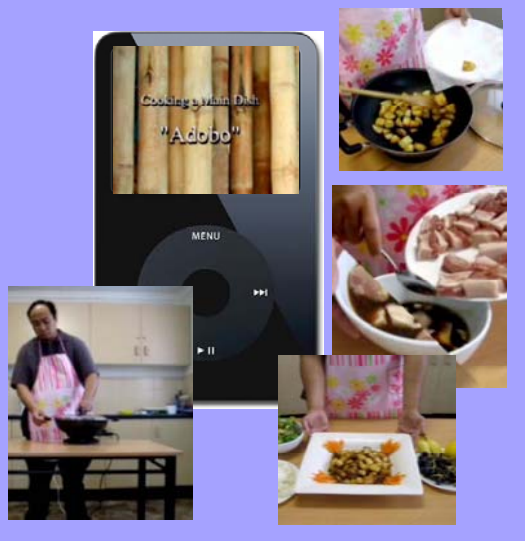
Mobile phone with camera

Curriculum/focus

Adult education

Task

Create a podcast of a workplace procedure: How to cook Adobo



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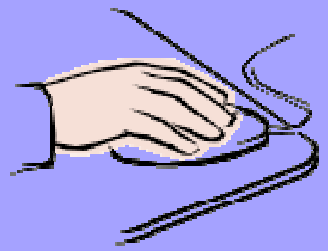
Role of technologies in these examples

Cognitive tools



Technology in the hands of the student (rather than the teacher)!

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Dissemination: Project website

- Project website
- Includes:
  - New pedagogies
  - Information on the team and reference group
  - Information on the project
  - Products of the project (such as the analysis of affordances of devices)

http://mlearning.uow.edu.au

A promising research approach

- Socially responsible educational technology research through **design-based research**

David Jonassen:

'Students cannot use [cognitive] tools without thinking deeply about the content that they are learning, and second, if they choose to use these tools to help them learn, the tools will facilitate the learning process'

Definition of design-based research

(Wang & Hannafin, 2005)

A systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories (p. 6)

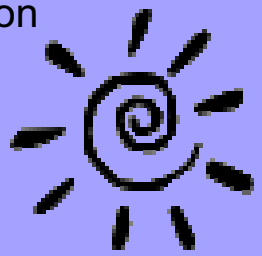
Checklist for design

- ☑ Authentic context
- ☑ Authentic activity
- ☑ Expert performances
- ☑ Multiple perspectives
- ☑ Collaboration
- ☑ Reflection
- ☑ Articulation
- ☑ Coaching and scaffolding
- ☑ Authentic assessment

Using technology as cognitive tools

Design-based research characteristics

- the use of an **iterative design and evaluation cycle:** interventions are adjusted as the **research** proceeds
- a focus on how the intervention worked



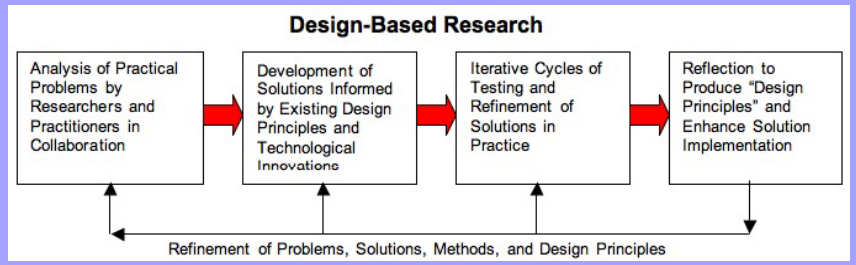
(Walker, nd)

Terminology

Design-based research =

- Development research
- Design experiments
- Design research
- Formative research

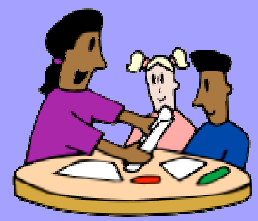
Phases of design-based research



(Reeves, 2006)

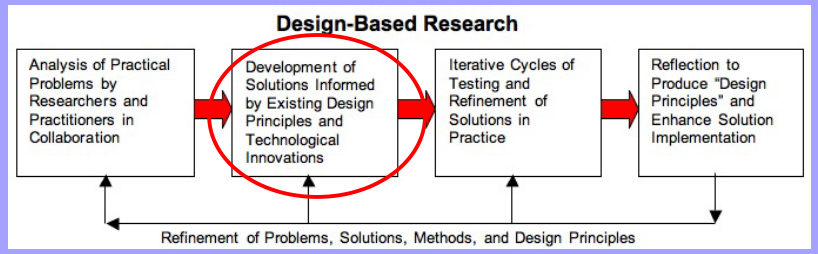
Design-based research characteristics

- an emphasis on conducting **research** in **authentic, natural educational contexts**, rather than laboratories
- the desire for **research** to have a **practical impact**, by having clear relevance for the improvement of education

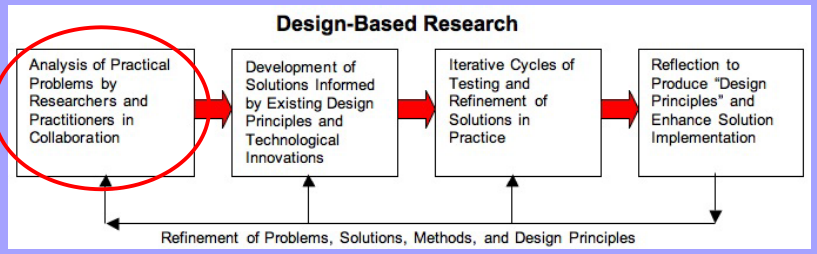


(Walker, nd)

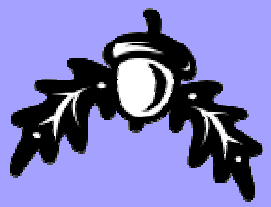
Phase 2: A solution



Phase 1: Exploration of problem

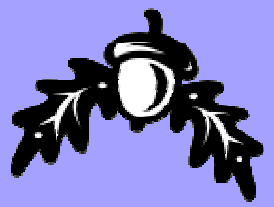


Phase 2:



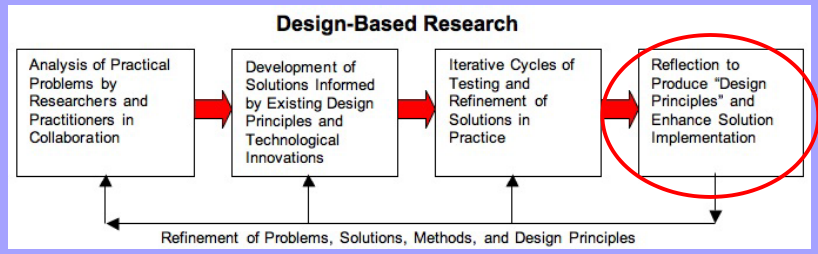
- **In brief:**
  - Find principles or advice on how others have addressed similar problems
  - Compile draft design principles
  - Design and develop a solution

Phase 1:

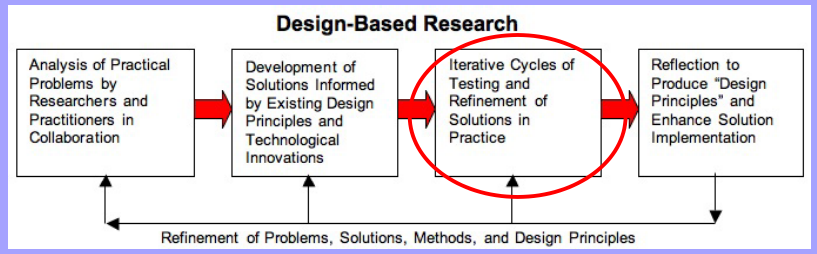


- **In brief:**
  - Explore the problem
  - Speak to other teachers about the problem
  - Read what others say about it

Phase 4: Design principles



Phase 3: Cycles of testing

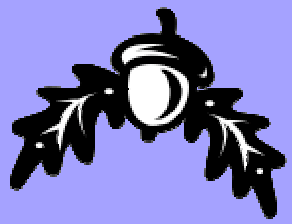


Form of principles

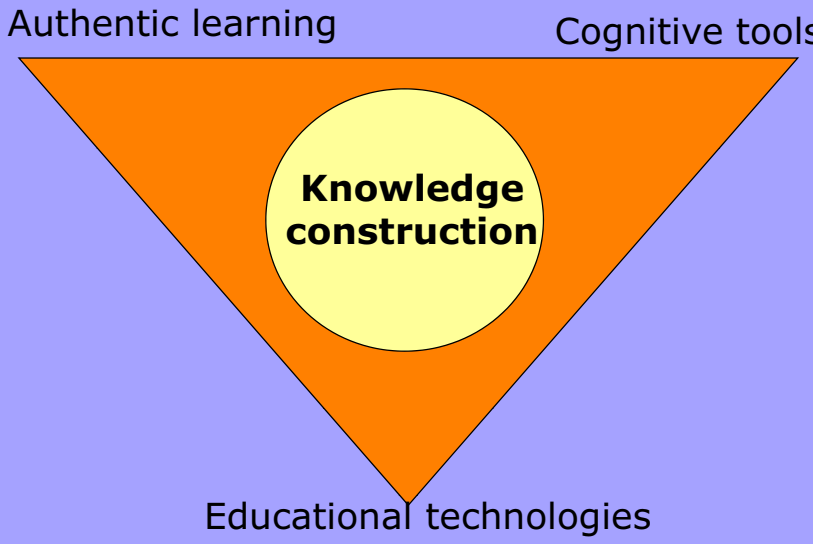
- "If you want to design intervention X then you are best advised to give that intervention the characteristics A, B and C"
  (Van den Akker, 1999)

Phase 3:

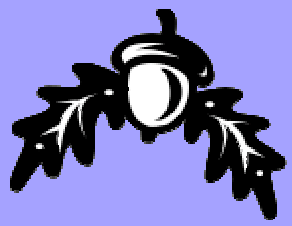
- **In brief:**
  - Try your solution with students
  - Collect data
  - Change your approach after the first time to improve it
  - Try again



Pedagogy for learning with technology



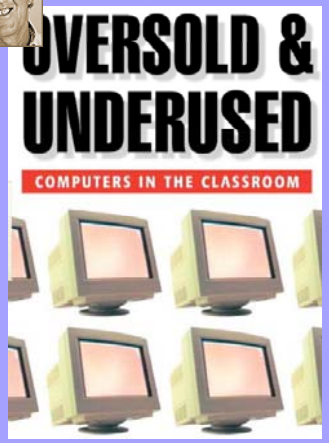
Phase 4:



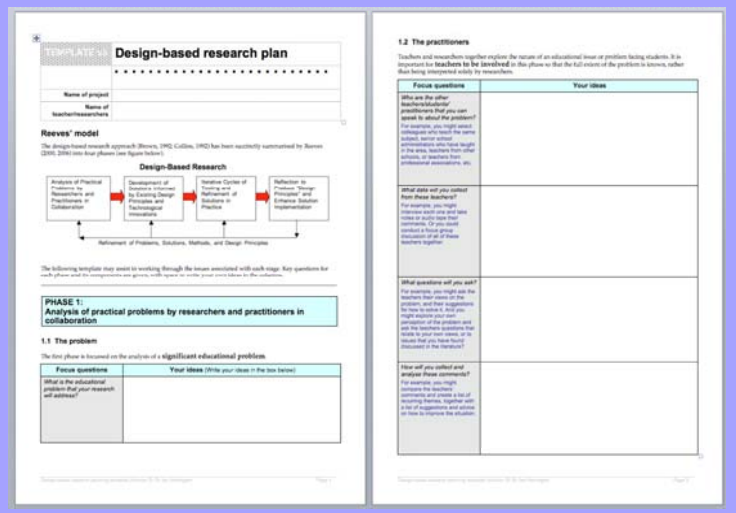
- **In brief:**
  - Reflect on your findings
  - Create principles (or advice) for others to follow
  - Publish and disseminate the results of your research

Technology without pedagogy

The facts are clear … powerful technologies end up being used most often for word processing and low-end applications in classrooms … After all the machines, money, and promises the results are meager.



Template to design study



http://web.me.com/janherrington/Expo

Website to accompany this presentation includes:

- Links and resources
- Downloadable papers

THANK YOU!

Technology with~~out~~ pedagogy

The facts are clear … powerful technolo… end up being u… most often for wor… processing a… d low-… d applications … classrooms … After all the machine… money, and promises… he results are mea…

http://d.hatena.ne.jp/shiinaneko/touch/20100715/1279252548