Designs of teaching & learning environments that have worked: attempting to generalize?

Conference sub-theme: Implementation of educational innovations

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Plan

- Context
- Design? Definition
- Knowledge building?
- Designs?
  - IBL Biology: high school teaching
  - ICT integration: academic/Teacher training.
  - i2CT: consultant academic teachers (4 modules)
  - Biology teacher basic training (FORENSEC)
  - etc
- Selected findings
- Some design rules
- Generalizing: let’s build knowledge!
Research context

- Biologist.
- IT integration lecturer coordinator 10yr
- Lecturer: biology / sciences teachers UniGE
- Thesis research in Educational sciences:
  - Biology evolution / IT-Rich biology -> knowledge building
Knowledge building ...

- Attempting to generalize?
  NOT about final « expert » generalizations

- We try Knowledge Building ... about K

- Objective: You will have built a few guidelines / designing your designs
Framework strong line 1

- Focus on learner role (cognitive activity)

- Lily Orland-Barak keynote, situated:
  - Focus on effective vs stated – roles
Framework strong line 2

- Alignement
- Objectives <- Evaluation <- Activities
- Objectives shared (Meaning)
- Good, T. L. (2008)
Framework strong line 3

- Conceptual artifacts
- Improvability
- Common understanding given priority over agreement.
- Commitment to expand the factual base.
- Selective criticism based on knowledge-advancement goals.
- Nonsectarianism.
Framework strong line 5

- Information overload:
  - More information?
- Various sources, quality, structure
  - Student select, integrate into coherent Knowledge -> long term employability?
- New competencies not usually taught
- Create Knowledge: conundrum for schools

First Example: i2TIC

- 752401 "Apprentissage Coopératif" organisé par Céline Buchs. ([wiki](http://example.com))
- Objectives: cooperative learning
- Course design: seminar (classical) satisfactory … but: get students
  - To READ,
  - To read in-depth
  - To synthesize across articles
  - Wants feed-back about student progress
First example: design

- Assignment: read research -> write to wiki
  - Deadline: reify, much more READ
  - Authentic
  - Reading and writing guidelines
    - Questions focus
    - Meaningful doc
- Peer analysis
  - Questions guide / meaningful doc.
- Student FB: difficulties / conceptions, interests.
- Lecturer reads wiki: focuses seminar discussions
Knowledge building / improvement?

- In short the problem is that of shifting students from knowledge telling to knowledge transforming.

Learning Environments = Design definition

  - Groups
  - Participants
  - Roles
  - Activities
  - Resources
    (ICT, Books, experiments, field)

- N.B: Learning Environment often includes an ICT artefact

Knowledge Building / Learning env Design

- KB Empower learners to Face Complexity
  - Bert Reijnen: real ideas authentic problems (Bereiter 2002)
  - Not popularize
- Design: Towards authentic resources
Knowledge Building / Learning env Design

- KB Extract relevant info
- Design: Students focused by (not on) questions
Knowledge Building / Learning env Design

- KB Synthesize – build new knowledge
  - Artefact building (Bereiter 2002)

- Design: Produce meaningful document expressing what we currently understand about

- Document -> motivation (vector)
Proposed design rule

- Think at meso level It-gradation module
Levels of analysis of design

- Whole course
- IT-gration-module : design feature
  - Component of design
  - Adresses a specific weakness of current desi
- Elementary educational IT activities
  - Sharing ressources, co-writing in wiki, analyzing text, commenting another’s text.
- IT actions
  - posting blog, writing wiki, photoretouch
IT-gration Modules

- E-portfolio support -> reify, distance
- Analysis in wiki
- Peer analysis² of texts in wiki
- Blogging about observations
IT-gration Modules

- E-portfolio support -> reify, distance
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Second example

- Empowering students to learn complex scientific (biology) concepts
- Science as a way of building Knowledge
- Last high school year
- Was presented 2nd PBPR
Knowledge Creation and Optimal Teaching & Learning Environments: What Works?

Second example. IBL design

(Cyber4OS)

- Elicit questions
- Experiment, observe, read.
- Compose Q & A
- Present / Discuss
- Reframe

The crucial difference between current formulations of inquiry and the traditional "scientific method" is the emphasis on recognition that inquiry is cyclic and nonlinear.

-Sandoval 2004

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Lombard F. 27
Results?

- See all 4 OS results here
- Effectively Build complex knowledge 
- Effectively capable of selecting and appraising qua 
- Not afraid of large books anymore 
- Exhaustivity -> datamining strategy
- Over 50% declare it efficient learning strategy next year at university.
Let’s see

- Authentic (IT-Rich Biology) ins
- Focussed by Q°
  - Co-preparing exams
  - Community of learners ??
- Meaningful doc.
Proposed design rule: Matrioskal model

- Matrioschka Russian *doll* model  
  Lombard, F. (2007)

Select, choose Wade infodense  
Questions  
Design  

Proposed design rule: Focus on learner role

- Role as expression of cognitive activity
  - Prepare exam: Synthesis
  - Peer comment -> Analysis
- Focus on effective vs stated – true roles
  - Keynote PBPR Bergen 25-27 XI 08
Proposed design rule

- Focus on common understanding of document role
  - Project -> Public?
  - Exam?
  - Common preparing of exams?
    - W2L: W not automatically 2L
      - A topic the writer cares about and an audience responsive to what the writer has to say are the essential ingredients for a profitable experience.

Proposed design rule: focus on meta-questions

- Limited time - presentations 4 OS
- Analysis\(^2\) in 12TIC
- Limited space -> Higher thinking
  - PBPR Bergen 25-27 XI 08
- Meta questions -> perspective about knowledge
Proposed design rule Embed structuring control into the design

- Empowers students.
- Frees the teacher for high level interaction.
- Formalizing design gives more freedom?
  - Example: define structure of document, presentation, time control
  - Goes against strong need for control / relatedness / ? (Amnon Glassner)
Proposed design rule: Embed structure in the design

- Wiki reifys interactions
- Deadlines
- Awareness
- Presenting to peers / co-writing
Proposed design rule

- Learn students strategies to manage complex information rather than popularize
- Structuring strategy: IBL
- T -> Coach/indexing role:
  - Question eliciting resources / activities.
  - Answer-finding resources / activities.
Question

- Teacher authority vs new role
- Hyp. Teacher authority influences involvement of learners (? )
- As teacher role changes, and authority of knowledge less forefront (?)
- How does perceived scientific authority of teacher influence involvement of students ?
Thankyou for your attention

- More
- http://doiop.com/flopublications
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