Have Teaching and Learning Interactions Fundamentally Shifted?

Some questions to ponder

Cheah Horn Mun (21st Sept 2013)
Outline

• Unpacking the question
• Key Trends and Challenges
• Pedagogical Responses?
• Assessment of 21st Century Skills
• Concluding Remarks
Teaching & Learning Interactions

- T&L involve the development of Values, Skills & Knowledge

- 2 main processes: Transfer & Deepening
  - Inter-related with some overlap
  - Note: ‘Creation’ processes treated as extension

- Question: How far has the New Media environment transformed these processes?
Trends & Challenges: Millennium Learners

• Who are they?
  – Not known life without mobile devices & Internet
Millennium Learners

• Learn better through discovery & experiential learning
  – Implication? Adult learning catering to fundamentally diverse learner profiles

• Shift attention (pseudo multi-tasking)

• Connected & expect fast response time

• Able to handle vast amount of disconnected information (?)
Trends and Challenges: Use of ICT

• Efficiency Use
  – No Change in T&L interactions
  – Gain in productivity & initial learner engagement

• Transformative Use
  – Change T&L interactions
  – Potentially enhanced and deeper understanding

• ‘Connectedness’ Use
  – Loss of control of learning outcomes
  – Deep but could be narrow; connected, yet disconnected
    • Eg. Treatment of Syria, blog experience
Trends and Challenges

• Pace of ICT advances
  – Changes replacing changes
  – Lack of time for consolidation & reflection
  – … however, basic T&L interactions seems to have been ‘stable’ for some time, perhaps until web 3.0

• Some comments on ‘New’
  – ‘New’ not necessarily ‘transformative’/‘progress’
  – ‘Old’ has internal logic – not necessarily understood
    • Fork – a ‘killer app’ from Roman times
  – Survive for X yrs, probably around for another X yrs
    • CDs, Fax, Alarm clock, netbooks, non-smart phones
  – Education: Focus on underlying T&L interactions
Trends and Challenges

• Changes in the way we consume ‘media’
  – From separate paths to integrated forms (eg. Sound, print & video merging)
  – From ‘deep’ (linear) reading to sampling
    • Shortening of news articles, snippets, bullet points
  – Increase in web media consumption at expense of reading (no drop in TV viewing)
  – Distraction technologies
  – Advent of social networking
  – Convergence of devices:
    • Slate + laptop + smart phones
    • Personal learning devices
Trends and Challenges

• Impact of new ways of media consumption?
  – Re-wiring of neural network (browsing vs. reading)
  – Cognitive engagement: less depth & reflection?
  – Greater need for collaboration skills
  – Cyber wellness

• **Case Study** – History & Future of ‘Books’
Pedagogical Responses

• From teaching to designer of teaching
  – Scaffolding of T&L interactions
  – Provision of ‘balance of perspectives’

• From info-gather to co-generator of knowledge
  – Re-shaping role of teachers
  – Focus on learning rather than just teaching needs

• Networks of learning/learners
Pedagogical Responses

• Acquisition of knowledge
  – Deep knowledge in ‘own’ area
  – Knowing where to look for knowledge

• Being a reflective practitioner
  – Constantly seek improvement (what is it I can do better the next time?)
  – Courage to tweak approaches
  – Ability to ‘measure’ new practices (action researcher)
Assessment of 21st Century Skills

• Not new, but need systematic development

• Assessment – already exists, but labour-intensive

• Automation: main ideas:
  – Deconstruct skill into defining attributes:
    • Eg. Collaboration: Communicate, monitor group processes & progress
    • Eg. Self-directed: Monitor own process, set goals, map future learning
  – Establish behavioural indicators for each attribute
  – Design tasks to elicit indicators
Assessment of 21st Century Skills

- **ATC21S (2009-12)**
  - Aim: Automation of 21st C assessments
  - 6 countries, 3 companies
  - White papers, books & 13 tasks

- **ATC21S Tasks**
  - 2 skills: Collaborative problem-solving & ICT literacies
  - Varying balance of attributes for each task
  - Content-dependent/independent
  - Asymmetric Info
  - Built-in ambiguity
Example of Task

The goal of the task is to select the recipe which makes the biggest profit. This task involves sharing information, assembling information and analysing information. As both players have different information and resources they need to discuss these in order to find the most profitable combination of recipes.

STUDENT A

PAGE 1

Player A will see the recipe options and the sales chart.
Player A can adjust the recipe options, which will change the sales chart accordingly.
Player A can also change the region.

STUDENT B

PAGE 1

Player B sees a market research report, which provides information on global hot chocolate drinking preferences. It also displays a profit chart which is influenced by the selections of each player.
Scoring Framework

Collaborative Problem Solving

Social
- Participation
  - Action
  - Interaction
  - Task Completion
- Perspective Taking
  - Adaptive Responsiveness
  - Audience Awareness
- Social Regulation
  - Negotiation
  - Self Evaluation
  - Transactive Memory
  - Responsibility Initiative

Cognitive
- Task Regulation
  - Resource Management
  - Information Collection
  - Systematicity
  - Ambiguity Tolerance
  - Organisation
  - Goal Setting
- Knowledge Building
  - Knowledge Acquisition
  - Represents Relationships
  - Identifies Consequences
  - Hypothesises
ATC21S Tasks

• What are being tracked? – ‘Action’ & ‘Discourse’

• Analysis: 1-parameter Item Response Theory

• ‘Scoring’ & ‘Automation’
  – Only ‘Action’ for now
  – ‘Teacher’, Peer & computer scoring (Strong correlation)

• Reports:
  – Aim: Info to support pedagogical responses
  – Students: Learning Readiness & Profile
  – Class profile
ATC21S – Comments

• Nascent development

• Needs contextualisation

• Scoring of ‘discourse’ – natural language processing

• Near term – blended assessment (human plus computer)
Concluding Remarks

• Use of ICT – gain some, lose some
  – Impact of computer-aided learning (Christof van Nimwegen, 2003) – need for less helpful software?
  – Plenty of gains, but be mindful of losses

• Has T&L interactions fundamentally changed?
  – Informal learning plays a greater role

• Yes.....
  – ICT re-shaping ‘transfer’ processes, eg. Khan Academy, flipped learning
  – Re-balancing between ‘transfer’ and ‘deepening’ – shifting roles of teachers
Concluding Remarks

• Not quite sure..... for ‘Deepening’
  – Underlying learning interactions largely the same, but ICT supports process, eg. Making thinking explicit
  – Changes uneven
  – Opens up formerly impracticable spaces

• Adult learning need to start thinking about developing & possibly certifying 21\textsuperscript{st} C skills – why?
Case Study – History & Future of Books

• Before Printing Press:
  – Communication – verbal
  – Info storage – songs & poetry, expensive
  – Writing – stones, planks, clay/wax tablets
  – Vocabulary – about 2 thousand words
  – Limited scope for knowledge transfer
Case Study – History & Future of Books

• After Printing Press:
  – Loss of ‘oral’ culture – powerful & verbal performances of high artistic & human worth
  – Reading is ‘unnatural’ – focused attention runs counter to evolutionary/survival habits (alert to changes in environment)
  – ‘silent’ reading – greater introspection, deeper thinking
  – Development of ‘private’ writing – allowed for deep intellectual & emotional engagement; mental imagery (no video/picture)
  – Flourishing of vocab (> millions), greatly increased flexibility & expressiveness of language (structures, syntax & (creative) expressions).
  – Development of scientific methods of inquiry – able to continually sharpen our understanding, setting down ‘rules’ for logical thinking
  – Negative: ‘low-minded’ literature
Case Study – History & Future of Books

- After Web 2.0:
  - Moving back to ‘social’ communication – simple language syntax/structures/vocab
  - Tendency to turn all media into social media
  - Shorter, less thoughtful prose – cell phone novels
  - Incorporation of social-networking functions: Community-developed novels – never-ending stories
  - Distracted reading – linearity of book dismanted

(Historian David Bell after reading an ebook on the web: ‘…interrupt myself more often…..Eventually ... read book.... a week later..... remarkably hard to remember what I read’)
The Design Problem

- Who’s the most consistent? (Grades 8-9)

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<th>Ivan Right</th>
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Goals Scored

- Mike Arwen
- Dave Backhead
- Ivan Right

Idea 3: Measure Graph Length

MA: $f_2 + f_6 + f_7 + f_8 + f_{10} + f_{12} + f_{17} + f_{20} + f_{26} + f_{28} + f_{30} + f_{36} + f_{40} + f_{56} + f_{60} + f_{62} = 83.26$

DB: $f_7 + f_{10} + f_{15} + f_{17} + f_{18} + f_{20} + f_{25} + f_{30} + f_{32} + f_{36} + f_{38} + f_{40} + f_{46} + f_{50} + f_{52} + f_{54} + f_{58} + 1 = 56.54$

IR: $f_{12} + f_{10} + f_{17} + f_{20} + f_{25} + f_{30} + f_{35} + f_{40} + f_{45} + f_{50} + f_{55} + f_{60} + f_{65} + f_{70} + f_{75} + f_{80} + f_{85} = 94.54$

Dave Backhead is the most consistent player as he has the shortest 'stretched-out' graph, showing consistency over time.
Selected Key Findings

- Productive Failure is better than traditional Direct Instruction on **conceptual understanding and transfer** without compromising **procedural fluency**

- Students that seem **strikingly dissimilar** on **academic competence** appear **strikingly similar** in terms of their **design competence**

- Design competence correlated with learning gains, but teachers/experts are generally good estimators of **academic competence** but not of **design competence**
Thank You!