The Assessment and Teaching of 21st Century Skills

Presentation to the AHISA Education Forum: Canberra Hyatt Hotel
Monday August 30

Patrick Griffin
communications

Bell to Jobs
communications

Marconi to Gates
Transitions in Society
Agrarian era

- Arts and Literature
- Land
- Labour
- Religion
The industrial revolution

Academic skills
Financial capital
Social Reproduction

Skills
Labour
Social reconstruction
Emphasis in Education

- **Industrial workforce**
  - Production
  - Distribution
  - Consumption

- **Industrial education**
  - Vocational
  - Academic
  - Industrial capital development

- **Classroom as a medium**
Education then and now?

Didactic

Multi media

Information
Emphasis in Education

- Information workforce
  - Production
  - Distribution
  - Consumption

- Information education
  - Access
  - Analysis
  - Evaluation
  - Application
  - Human capital development

- Technology as a medium
Sponsorship & Partnerships

- Founding partners
  - Cisco, Intel, Microsoft

- Founder countries
  - Australia, Finland, Portugal, Singapore, England, USA

- Academic Partners
  - University of Melbourne

- (Advisory Panel)
  - OECD
  - IEA
  - UNESCO
  - World Bank
  - Inter American Development Bank
  - National Academy of Sciences

- atc21s-general@unimelb.edu.au
Defining 21st Century Skills

- **Conceptual structure**
  - **Ways of thinking**
    - Creativity and innovation
    - Critical thinking, *problem solving*
    - Learning to learn, metacognition
  - **Ways of working**
    - Communication
    - Collaboration (teamwork)
  - **Tools for working**
    - Information literacy
    - ICT literacy
  - **Living in the world**
    - Citizenship – local and global
    - Life and career
    - Personal, *social responsibility*
  - **Ways of learning**
  - **Ways of teaching**
The project R&D plan

Phases

1. Conceptualisation (Dec 08-Jan 10)
   - White papers
   - KSAVE
   - (working parties)

2. Hypothesis formation (Jan 10-may 10)
   - Expert panels
   - Construct definitions
   - (expert Panels)

3. Development (May 10-Oct 10)
   - Draft (May 10-Oct 10)
   - Panel, cognitive lab Oct 10-Dec 10
     - Coding and feasibility
     - Teaching implications
   - Pilots (Feb 10- July 11)
     - Administration procedures
     - Resource issues
     - Documentation
     - (Developers/Panels/Project Office/NPM)

4. Trials and Dissemination/Scale (Jul 11-Dec 11)
   - Calibration
   - Presentations
     - Policy frameworks
     - Scaling up
   - (Project office/CIM )
The project R&D plan

Outcomes
- Advances in technology-based assessment
- Focus of social skill assessment
- Model of corporation/education alliance
- Cross national collaboration in development
- Industry/government/education partnerships

All available in public domain,
- Strategies will be made available for
  - OECD for PISA 2012, 2015
  - IEA for digital literacy study 2013
  - National surveys of student and adult achievement
  - Commercial test development
  - Classroom use
Outcomes and project plan

Expected and planned

- **2009 - 2011**
  - White Papers defining the skills, reviewing previous work and identifying issues for research and development
  - New forms of assessment
    - Assessment strategies - validated in pilot projects - NOT specific tests
  - Country pilots/ trials

Extension...

- **2011 – 2013**
  - Link to PISA data collection
  - Influence national assessments
  - Link to IEA ICT study

- **2014 –**
  - Influence classroom teaching and learning through change in assessment
Learning in a digital context

- LEARNING OUTCOMES
  - SOCIAL NETWORKING
  - INFORMATION LITERACY
  - TECHNOLOGICAL AWARENESS
  - ROBOTICS

BASIC ENABLING SKILLS

ICT LITERACY
Domain outline

- LDC - ICT literacy encompasses
  - social networking,
  - information literacy,
  - technological awareness,
  - and human-technology interactions (e.g. robotics)

- Contributes to learning to learn (L2L) on a basis of enabling skills

- Focus on social networking
  - Four threads
Four threads of social networks

- Functioning as a **consumer** in social networks
- Functioning as a **producer** in social networks
- Participating in the development of **social capital** through social networks
- Participating in **intellectual capital** (collective intelligence) in social networks
## CONSUMER IN SOCIAL NETWORKS

**Discriminating consumer**
- Judging credibility of sources/people
- Integrating information in coherent knowledge framework
- Searches suited to personal circumstances
- Filter, evaluate, manage, organize and reorganize information/people
- Seeking expert knowledge (people through networks)
- Select optimal tools for tasks/topics

**Conscious consumer**
- Select appropriate tools and strategies (strategic competence)
- Construct targeted searches
- Compiling information systematically
- Knowing that credibility is an issue (web pages, people, networks)

**Emerging consumer**
- Performing basic tasks
- No concept of credibility
- Search for pieces of information using common search engines (e.g. movie guides)
- Knowing that tools exist for networking (e.g. Facebook)
Developing & sustaining social capital through networks

- using, developing, moderating, leading and brokering the connectivity within and between social groups in order to marshal collaborative action, build communities, maintain an awareness of opportunities and integrate diverse perspectives at community, societal and global levels
  
  - better and worse forms of social participation and connectedness
  - resources or advantages that accrue to a group or person by virtue of being embedded in social organizations
  - of benefits associated with increased common ground
  - Balance of diversity and common ground - typically in tension
## DEVELOPER OF SOCIAL CAPITAL

| **Visionary connector** | Take a cohesive leadership role in building a social enterprise  
<table>
<thead>
<tr>
<th></th>
<th>Reflect on experience in for social capital development</th>
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</thead>
</table>
| **Proficient connector** | Initiate opportunities for developing social capital through networks (e.g. support for development)  
|                     | Encourage multiple perspectives and support diversity in networks (social brokerage skills) |
| **Functional connector** | Encourage participation in and commitment to a social enterprise  
|                     | Awareness of multiple perspectives in social networks  
|                     | Contribute to building social capital through a network |
| **Emerging connector** | Participating in a social enterprise  
|                     | Observer or passive member of a social enterprise  
|                     | Knowing about social networks |
Developing & sustaining intellectual capital through networks

- understanding how tools, media and social networks operate and using appropriate techniques for operating on those resources to build collective intelligence and integrate new insights into personal understandings
  - ongoing process of collective reflection and action
  - marshalling of available knowledge to act in an effective and efficient manner to achieve some purpose
  - online communities have multiple purposes with less coherence, more diverse motivations, and hence a greater need for complex mechanisms for marshalling and using information
<table>
<thead>
<tr>
<th>Visionary builder</th>
<th>Participator in Intellectual Capital (Collective Intelligence)</th>
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</thead>
<tbody>
<tr>
<td>Questioning existing architecture of social media and developing new architectures</td>
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<tr>
<td>Functioning at the interfaces of architectures to embrace dialogue</td>
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<table>
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<tr>
<th>Proficient builder</th>
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<tr>
<td>Understanding and using architecture of social media such as tagging, polling, role-playing and modeling spaces to link to knowledge of experts in an area</td>
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<tr>
<td>Identifying signal versus noise in information</td>
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<td>Interrogating data for meaning</td>
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<tr>
<td>Making optimal choice of tools to access collective intelligence</td>
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<td>Sharing and reframing mental models (plasticity)</td>
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<tr>
<th>Functional builder</th>
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<tr>
<td>Acknowledges multiple perspectives</td>
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<td>Thoughtful organization of tags</td>
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<tr>
<td>Understanding mechanics of collecting and assembling data</td>
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<tr>
<td>Knowing when to draw on collective intelligence</td>
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<td>Sharing representations</td>
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<th>Emerging Builder</th>
<th>Participator in Intellectual Capital (Collective Intelligence)</th>
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<tr>
<td>Knowledge of survey tools</td>
<td></td>
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<tr>
<td>Able to make tags</td>
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<tr>
<td>Posting a question</td>
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Collaborative problem solving
Collaborative problem solving as a 21st Century Skill may be seen as a combination of its component parts. These are collaboration, problem solving and the new technologies currently believed to characterise the 21st century.
Definitions

- Collaboration – working together to achieve a common goal
  - Communication
  - Cooperation

- Problem solving
  - Knowledge
  - Strategies
Components

Collaborative problem solving

Social skills
- Participation
- Perspective taking
- Social regulation

Cognitive skills
- Task regulation
- Knowledge building
## Participation skills over levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
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| Low    | - Peripheral participation  
          - Low subjective responsibility for outcomes of collaboration, leading to lurking behavior  
          - Simple epistemological beliefs (knowledge is perceived as fixed and to be transmitted from teacher/textbook to learner) |
| Middle | - Activity in scaffolded environments  
          - Responding to cues in communication  
          - Medium subjective responsibility for outcomes of collaboration  
          - Developed epistemological beliefs (knowledge is perceived as fixed, but can be elaborated through communication and collaboration) |
| High   | - Initiating and promoting interaction  
          - Activating and scaffolding others in participation  
          - Ensuring equal participation rates among group members  
          - High subjective responsibility for outcomes of collaboration  
          - Sophisticated epistemological beliefs (knowledge is perceived as fluid, constructed, and inherently social/collaborative in nature) |
## Perspective taking skills

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<tr>
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| **Low** | - Low levels of empathy  
           - High egocentric bias  
           - Social projection (expectation of others as highly similar to oneself)  
           - Ignoring contributions from others  
           - Contributions are not tailored to participants |
| **Middle** | - Medium levels of empathy  
              - Medium level of egocentric bias  
              - Receptive ability (being able to understand what others want to convey, e.g. from overhearing)  
              - Contributions from others are taken into account  
              - Contributions are moderately tailored to recipients |
| **High** | - High levels of empathy  
            - Low or no egocentric bias  
            - Contributions from others are embraced and contextualized with respect to collaborators’ opinions and skills  
            - Eliciting contributions from others (e.g. through questions)  
            - Contributions are tailored to recipients (audience design) |
## Social regulation skills

<table>
<thead>
<tr>
<th>Level</th>
<th>Characteristics</th>
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| Low     | - Low tolerance for ambiguity  
- Competitive or individualistic social value orientation  
- Low readiness to negotiate joint understanding  
- Tendency to withdraw after conflict arises |
| Middle  | - Cooperative social value orientation  
- Attempts to negotiate joint understanding  
- Conflicts will be avoided  
- Initiation of compromises |
| High    | - Pro-social attitudes  
- Strategies for conflict resolution  
- Conflicts are regarded as productive tensions  
- Initiation of successful compromises |
<table>
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</table>
| Low    | - Trial and error hypothesis testing  
         - Unorganized sequence of solution attempts  
         - Little or no goal setting  
         - Variety of taskwork mental models will be ignored |
| Middle | - Forward search through a problem space  
         - Organized sequence of solution attempts  
         - Setting of unspecific goals  
         - Variety of taskwork mental models will be taken into account |
| High   | - Reflective regulation  
         - Forward and backward search through a problem space  
         - Strategic oversight over collaborative strategy  
         - Setting of specific goals  
         - Variety of taskwork mental models will be harnessed productively |
# Knowledge building skills

<table>
<thead>
<tr>
<th>Level</th>
<th>Skills Description</th>
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| Low    | - Knowledge telling  
         - Sharing of information  
         - Isolated contributions  
         - Lack of argumentation patterns |
| Middle | - Critical analysis of information  
         - Building on input from others  
         - Adding artifacts  
         - Forming of incomplete arguments |
| High   | - Knowledge transforming  
         - Integration and synthesis of multiple artifacts  
         - Forming of complete, proper arguments (explanatory coherence) |
Hypothesis Formation 2010

Executive Director
- Professor Patrick Griffin, University of Melbourne

International Research Coordinator
- Associate Professor Esther Care

Hypotheses of C21 skills
- Learning in a Digital Environment
  - Panel Chair
    - Dr John Ainley
- Collaborative Problem solving
  - Panel Chair(s)
    - Professor Stella Vosniado/ A Prof Esther Care
- Reasoning in Problem Solving
  - Panel Chair
    - Dr Beno Csapo, University of Szeged, Hungary