Orchestrating Learning Scenarios for the Borderless Classroom

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Presentation Outline

1. Theoretical background on boundary-crossing learning scenarios

2. Case Study: Singapore Future School project on in-and-out of the classroom inquiry-based learning
What is context?

- The combination of all of the elements surrounding a given event that can be psychologically meaningful, including interpersonal dynamics, situational features owing to a place or location, memories, goals for the future and internal body or brain states (Wager & Atlas, 2015).

- Context arises from the activity. It is not just ‘there’, but is actively produced, maintained and enacted in the course of the activity at hand (Dourish, 2004).

- Context is largely composed by the interactions that individuals have with entities in the different “compartments” of the world. Entities can be ‘objects’, ‘people’, ‘processes’ and ‘ideas’ (Westera, 2012).
Example setting

External context
- Verbal suggestions: “This is going to make you feel better”
- Place cues: Doctor’s office
- Social cues: • Eye gaze • Body language • Voice cues • White coat

Internal context
- Outcome expectancies: “My pain will go away”
- Emotions: “I am less anxious”
- Meaning schema: “I am being cared for”
- Explicit memories
- Pre-cognitive associations

Treatment cues:
- Syringe
- Needle puncture

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Why is context important for learning?

• The real world attributes of a context enable learners to directly link concepts with their real world counterparts and to put knowledge into action (Westera, 2011, p.201)

• Experience and learn about properties (e.g. smell, weight) of world entities interwoven with context (Schank & Cleary, 1995 in Westera, 2011; Greeno, 1998)

• It allows learners to apply knowledge, skills and attitudes, see their effects and that they are useful to achieve objectives (meaningful learning)

• Construction of knowledge as meaning making in situations and activities in authentic contexts” (Situated learning, Lave & Wenger, 1991)

• Knowledge co-construction (Social learning, Scardamelia and Bereiter, 1999, 2005)
<table>
<thead>
<tr>
<th>Type II</th>
<th>Type III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned learning out of class</td>
<td>Emergent learning out of class</td>
</tr>
<tr>
<td>E.g. Field trip to heritage site which is part of a school curriculum</td>
<td>E.g. Using mobile phones to capture pictures and video clips of animal and directed by self-interest</td>
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</table>

<table>
<thead>
<tr>
<th>Type I</th>
<th>Type IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned learning in class</td>
<td>Emergent learning in class</td>
</tr>
<tr>
<td>E.g. Searching for answers in the classroom</td>
<td>E.g. Teachable moments not planned by the teachers</td>
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Seamless learning

• “Seamless learning is when a person experiences a continuity of learning and consiously bridges the multifaceted learning efforts, across a combination of locations, times, technologies and social settings” (Sharples et al., 2012, p.24)

Aims:

• to enable people to engage in productive self-regulated learning that spans times, locations, devices and tasks (Wong & Looi, 2012)

– A learner may experience a flow state of continual engagement with a topic regardless of the passing time and changing surroundings (Sharples, 2015). They are engaged in an overarching context where they are impervious to physical, temporal, social or technological changes (Sharples, 2015)
What learning and monitoring processes are important for seamless learning?

- Goal-setting, monitoring and reflection
- Flow (Sharples, 2015), focus/attention and motivation (Ryan & Deci, 2002)
- Encoding of cognitive schema (de Jong & Ferguson, 1996; van Merrienboer, 1997)
  - conceptual, procedural and strategic knowledge
    E.g. by cognitive dissonance, induction, deduction, repetition etc.
- Transfer of learning
How can we foster these learning processes?

Facilitating an ‘overarching context’ by means of e.g.:
- Inquiry-based learning (weSPOT)
- Experiential learning (Zull, 2002)
- Networked and collaborative learning
- Learning by play; play-based learning
- Problem-based, project based, design based and competence based learning

Fostering activities like:
- Collaboration: knowledge co-construction, argumentation, logics, cognitive conflict/grounding, organization, social binding
- Observation and imitation of examples/role models
- Comparison (of performances, of experiences) and critical thinking
- Story-telling and story-making
- Inquiring/researching and designing/creating

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Case Study:
Singapore Future School Project

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Research Context

1. One of the Singapore Future Schools
   - whole school approach (IDM tools & mobile technologies)
   - small teacher-student ratio (1:20)
   - 1:1 computing (1 Macbook per student)

2. Research project: Mobile learning activities to foster knowledge building & critical thinking skills in integrated humanities
   - Mobile: technological affordances that enhance connectivity and mobility
   - Learning: pervasive knowledge building practices across contexts
Theoretical Framework

Control distributed across multiple agents e.g. peers, trs. & tools

Sharples, Taylor & Vavoula 2005

Mobile Learning

Context constructed by the learners interacting with the environment

Orion & Hoffstein 1994

Cognitive space + Psychological space + geographical space

Process-oriented design to frame learners’ discourse & interaction: learning objectives, task type, level of pre-structuring & technology mediation as critical design elements

(Strijbos, Martens & Jochems 2004)
Process-oriented Design

1. Learning Objectives

- Inquiry-based Learning: BIG (Beyond Information Given) Question
- Collaborative Knowledge Building
- Integrated conceptual understanding (History & Geography)
BIG Question: What is the role of Sentosa in the British’s big plan of defence?

Student groups either follow the route A-B-C-D or the route A-C-B-D to complete tasks at each station.
## Process-oriented Design

### 2. Task Type

Progressive task structured-ness: well-structured to ill-structured

### Station A

<table>
<thead>
<tr>
<th>Task type</th>
<th>Description of tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performative</td>
<td>Determine the direction of the guns using the iPad compass</td>
</tr>
<tr>
<td>Knowledge Generative</td>
<td>Describe the dimension of the tunnel and state its purpose</td>
</tr>
<tr>
<td>Knowledge Synthesis</td>
<td>Why did the British erect another tower in this area?</td>
</tr>
</tbody>
</table>
Process-oriented Design

3. Level of pre-structuring

- Three-essential pre-field trip variables: “Cognitive, psychological, geographical novelty”
- “… the place of the field in formal curriculum.” (Orion & Hofstein, 1994)
Process-oriented Design

4. Technology mediation

- Web-based platform hosting all trail tasks, students’ collected data & artifacts
- Virtual facilitation: broadcast alert & feedback features
- iPads with embedded apps
Web-based Platform

B2 You have arrived at the tower; you observe that the gun is pointing out to the sea.

**Explain why the previous artillery gun (Area A) and this one are pointed at the similar direction.**

It was to shell the oil refinery on Pulau Bukom during the battle and defend themselves against fast light craft such as torpedo boats.

**Feedback**

*Posted by Jennifer Tay at 29-03-2011 3:35 pm*
Why do you think there were torpedo boats? Explain your answer.

*Posted by Serene Lim at 29-03-2011 2:54 pm*
Do you think there was the oil refinery at Pulau Bukom in the 1930s?
Design Progression of the Four Mobile Learning Trails

**Time & Site**
- **Geography Learning Trail**: March 2010, Sentosa Island
- **The Fall of Singapore Trail**: July 2010, World War II Battle Sites
- **British Defense Strategy Trail**: March 2011, Fort Siloso
- **River Mystery Trail**: August 2012, Singapore River

**BIG question**
- What are the main reasons for the fall of Singapore to Japan?
- What is the role of Sentosa in the British’s big plan of defence?
- Why does civilization start at river mouth?

**Progressive Refinement & Adaptation**
Sneak Preview Featuring the 3rd Mobile Learning Trail

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Methodology

- Participants
  - School of Science & Technology (Future School)
  - Two classes of students
  - One high ability (HA) & one mixed ability (MA)

- Data Source
  - Self Report Measures (Questionnaires)
  - Focused group interviews with students and teachers
  - Audio & video-recording
  - Field notes
Data Analysis Approach

1. Quantitative Analysis
2. Qualitative Analysis
   - Verbatim transcription of all audio footage
   - Content analysis
     Use of semantic boundaries i.e., discussion threads, ideas and turn of talks to define an unit of analysis (Chi, 1997)
Key Findings from the Four Mobile Learning Trails

<table>
<thead>
<tr>
<th>Time &amp; Site</th>
<th>BIG question</th>
<th>Progressive Refinement &amp; Adaptation</th>
<th>Findings</th>
<th>Repair Strategies in Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geography Learning Trail</td>
<td>March 2010 Sentosa Island</td>
<td>What are the main reasons for the fall of Singapore to Japan?</td>
<td>Lack of continuity &amp; intentional learning</td>
<td>3-stage model (pre-to-post trail to connect varying contexts of learning)</td>
</tr>
<tr>
<td>The Fall of Singapore Trail</td>
<td>July 2010 World War II Battle Sites</td>
<td>What is the role of Sentosa in the British’s big plan of defence?</td>
<td>Lack of deep discourse</td>
<td>Embed unforeseen variables &amp; contextual resources</td>
</tr>
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<td>British Defense Strategy Trail</td>
<td>March 2011 Fort Siloso</td>
<td>Why does civilization start at river mouth?</td>
<td>Task-focused &gt; understanding focused</td>
<td>Embed unstructured activity &amp; facilitate common grounds</td>
</tr>
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<td>River Mystery Trail</td>
<td>August 2012 Singapore River</td>
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1. Design Intentional learning Experiences Across Spaces & Time
   - Reduce the ‘novelty space’: 3-stage Model (Pre-to-post)
   - BIG question: connecting different learning contexts
   - Structured vs. Unstructured learning activity

2. Promote interdisciplinary thinking and discourse

References


References


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Thank you...

Questions & Discussion
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