Exploring the Influence of Culture on Collaborative Learning

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Outline

• **Design problem:** designing culture general collaborative learning environments
• **Specific example:** argumentation
• **Proposed solution:** dynamic collaborative learning support
• **Nagging questions**
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  - Specific example: argumentation
  - Proposed solution: dynamic collaborative learning support
  - Nagging questions

Research Questions

- Practical: How can we design collaborative learning environments that foster effective learning in multiple cultural contexts?
  - Theoretical: How can we become more aware of how cultural variables affect how students respond to educational interventions?
Design Challenge: Collaborative Process Problems Hurt Learning

Interaction Processes

\[ \downarrow \]

Cognitive Processes

\[ \downarrow \]

Learning

Problems with the Process reduce learning

Collaboration support increases learning

\[ \times \]

Support Structure

\[ \downarrow \]

Interaction Processes

\[ \downarrow \]

Cognitive Processes

\[ \downarrow \]

Learning

But if the process difficulties are not the same between cultures, then the support needs to be different too.
Process Problems in Collaborative Learning

- Process Loss (Brown & Paulus, 2002)
- Shallow help (Webb, Nemer, & Zuniga, 2002)
- Talking at cross purposes (Weinberger, 2003)
- Status oriented conflicts (Elbert & de Hann, 2004; ten Dam, Voman & Wardekker, 2004)

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Example Cultural contrast: Argumentation

- Argumentation is important for learning (Leitão, 2000; Voss & Van Dyke, 2001)
- Americans tend to focus on the points where they disagree (Setlock et al., 2004)
  - **Pro:** focus on differences more likely to lead to cognitive conflict (Piaget, 1985)
  - **Con:** less discussion in general
  - **Solution:** design support that creates conflict or otherwise elicits more discussion
- Asians may discuss each point regardless of whether they disagree or not (Setlock et al., 2004)
  - **Pro:** more thorough discussion, possibly more explanation (Chi et al., 2000)
  - **Con:** not all discussion equally valuable for learning
  - **Solution:** emphasize productive discussion and de-emphasize unproductive communication
- Implication: support may need to be different for Asians than for Americans

Collaborative Learning Support

- **Script based support increases effective argumentation** (Weinberger, 2003)
- **Effective in Germany, but would it work in Taiwan?**
Collaborative Learning Support

- Script based support increases effective argumentation (Weinberger, 2003)
- Effective in Germany, but would it work in Taiwan?

<table>
<thead>
<tr>
<th>Prompts for the constructive critic</th>
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</thead>
<tbody>
<tr>
<td>These aspects are not clear to me yet:</td>
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<tr>
<td>We have not reached consensus concerning these aspects:</td>
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<tr>
<td>My proposal for an adjustment of the analysis is:</td>
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<td>Regarding the desire for clarity:</td>
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<tr>
<td>Regarding our difference of opinions:</td>
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<td>Regarding the modification proposals:</td>
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How do we meet the needs of learners from different cultures?

- Collaboration support should be dynamic rather than static
  - Can respond to different patterns of interaction
  - Some Westerners may behave more like Asians and vice versa
- Dynamic support has other pedagogical motivations
  - Support should be faded over time (Collins et al., 1991)
  - Unnecessary support can be demotivating (Dillenbourg, 2002)

TagHelper Project

- Automatic analysis of conversational data
  - Automatic collaborative learning process analysis (Donmez et al., 2005; Wang et al., 2007b)
  - Trigger support on an as-needed basis
- Publicly Available Tool
  - [http://www.cs.cmu.edu/~TagHelper.html](http://www.cs.cmu.edu/~TagHelper.html)
  - Currently provides text processing support for English, German, and Chinese
Coding provides an analysis of on-line argumentation

*Question: How can we prevent a debris flow hazard from happening*

<table>
<thead>
<tr>
<th>Social Modes</th>
<th>Macro</th>
<th>Micro</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Externalization</td>
<td>Argument</td>
<td>Claim</td>
<td>We should limit urban development.</td>
</tr>
<tr>
<td>Externalization</td>
<td>Argument</td>
<td>Warrant</td>
<td>Over-development puts a strain on the environment.</td>
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<tr>
<th>Quote</th>
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**Dynamic Support Using Dialogue Agents**

**Conferencing Mode:**
- Student 1, Student 2 & Dialogue Agent

**Task Description**
- Conferencing Mode:
  - Student 1
  - Student 2
  - Dialogue Agent

**Student 1’s Contribution**

**Student 2’s Contribution**

**Agent’s Feedback**
Example Dialogue

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Text</th>
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<tbody>
<tr>
<td>Student 1</td>
<td>People stole sand and stones to use for construction.</td>
</tr>
<tr>
<td>VIBRANT</td>
<td>Yes, stealing sand and stones may destroy the balance and thus make mountain areas unstable. Thinking about development of mountain areas, can you think of a kind of development that may cause a problem?</td>
</tr>
<tr>
<td>Student 2</td>
<td>Development of mountain areas often causes problems.</td>
</tr>
<tr>
<td>Student 1</td>
<td>It is okay to develop, but there must be some constraints.</td>
</tr>
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Can we avoid a completely separate design effort in every cultural context?

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<th>Partial Transfer</th>
<th>100% Transfer</th>
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<td>Separate design effort in each context</td>
<td>Some findings transfer and other investigations must be conducted in multiple contexts</td>
<td>Design effort in one context is sufficient</td>
</tr>
</tbody>
</table>

How can we efficiently identify the aspects of design of collaborative learning environments that warrant “redundant” efforts in different cultural contexts?

Other nagging questions...

- Related to communication
  - How can we make sure our process analyses are measuring the same thing across different languages?
  - How can we be sure our coding schemes are not biased by our own cultural expectations?

- More general
  - How do we identify equivalent comparison groups across countries?