Pieces of Knowledge: Multimodal Emergence and Trajectory in Socio-Scientific Educational Debates
Claire Polo

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ARGUMENTATIVE RESOURCES IN SOCIO-SCIENTIFIC EDUCATIONAL DEBATES

A great heterogeneity

- science teaching (e.g. Driver, Newton, Osborne, 2000, Sadler & Zeidler, 2005)
- citizenship education (e.g. Legardez & Simonneaux, 2006)

Subjectivity (e.g. Oulton, Dillon, Grace, 2004)
- socio-ethical beliefs + values + interests

Controversy (e.g. Albe, 2009)
- appeal to students’ “system of mental representations and knowledge” (Beitone & Legardez, 1995, système de représentations-connaissances)

PEDAGOGICAL SETTING: the YouTalk Scientific Café

Participants: 12-14 year-old students
- Specially trained student moderators
- 15-17 year-old students
Schools: 2 in Mexico, 1 in USA, 1 in France, 2 in Brazil

MODERATORS’ TRAINING (1 day)
To lead the YouTalk Scientific Café about Drought Water Management in pairs

YOUTALK - INTRODUCTION (10 min)
Game rules:
- Main Question (MQ)
- First Individual Anonymous Vote

YOUTALK - THEMATIC PHASES (3 x 20 min)
- MQ (x3)
  - reading and group discussion
  - individual vote
  - answer and explanation
  - group vote and class debate
  - individual vote and results displayed
- OQ
  - reading and group debate
  - group vote and class debate
  - individual vote and results displayed

YOUTALK - CONCLUSION (15 min)
Synthesis of class debates (3 OQ):
- MQ
  - reading and group debate
  - group vote and class debate
  - individual vote and results displayed

FIRST RESULTS FROM THE US CORPUS:
Different spatio-temporal localizations associated with different scenarios of material environment exploitation

Mostly consists of:
- reading the slide or referring gesturally to the screen
- using something to point
- handling the clicker to display determination to select an option or emergency to get to a conclusion (positioning on interactional function)

Exploitation of the material environment mostly occurs at the group level
- Initial group discussion for quiz elucidation (KQ)
- Supporting meaning-making process (mostly referential functions)
- Reinvestment in group debate to select an answer (OQ)
- Appeal to authority and interactional functions

Different knowledge units associated with different gestural scenarios

<table>
<thead>
<tr>
<th>“Virtual water”</th>
<th>Price / Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Improper gestures</td>
<td>- Less and smaller gestures</td>
</tr>
<tr>
<td>- Referential function</td>
<td>- Diversity of functions</td>
</tr>
<tr>
<td>- Little redundancy with speech</td>
<td>- More redundant with speech</td>
</tr>
<tr>
<td>- Repetitions</td>
<td>- Reinvestment with other words or gestures</td>
</tr>
</tbody>
</table>

Favouring or disturbing acquisition?

HOW DO THE STUDENTS CO-CONSTRUCT AND REINVEST MICRO-UNITS OF KNOWLEDGE-BELIEF?

- Temporal tracking (Transana)
- Spatio-communicative specificity
- Multimodal characterization (ELAN)

ARE EMERGENCE AND TRAJECTORY FEATURES KNOWLEDGE-SPECIFIC?

- Focus on units of different epistemic status
  - Knowledge piece specific to environmental education
  - Classical distinction between the cost and the price of a good or service, both school target knowledge in economics and part of daily life vocabulary

- Comparison of emergence multimodal features and spatio-temporal trajectory

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