Pieces of Knowledge: Multimodal Emergence and Trajectory in Socio-Scientific Educational Debates
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ARGUMENTATIVE RESOURCES IN SOCIO-SCIENTIFIC EDUCATIONAL DEBATES

A great heterogeneity

Interdisciplinarity
science teaching (e. g. Driver, Newton, Osborne, 2000, Sadler & Zeitler, 2005) + citizenship education (e. g. Legardez & Simonneau, 2006)

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

Controversy (e. g. Albe, 2009)

First results from the US corpus: Multidimensional Emergence and Trajectory in Socio-Scientific Educational Debates

Pieces of Knowledge: Multidimensional Emergence and Trajectory in Socio-Scientific Educational Debates

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 Drinking Water Management in pairs

YouTalk - Introduction (10 min)
Game rules
Main Question (MQ): Final Individual Anonymously Vote
Introduction to the 3 thematic phases

YouTalk - Thematic phases (3 x 20 min)
KQ (x3)
reading and group discussion
individual vote, answer and explanation
reading and group debate
group vote and class debate
individual vote and results displayed

OQ
Group vote and class debate

YouTalk - Conclusion (15 min)
Synthesis of class debates (3 OQ)
MQ
reading and group 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

Exploitation of the material environment mostly occurs at the group level
Initial group discussion for quiz elucidation (KQ)
Reinforcement in group debate to select an answer (OQ)
Supporting meaning-making process
(mostly referential functions)
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>Imprecise gesture</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>Repetition</td>
<td>-Reinvestment with other words or gestures</td>
</tr>
</tbody>
</table>

Exploitation of the material environment is not very sensitive to the knowledge content.

YouTalk - Conclusions (15 min)

Knowledge-Belief

Knowledge-Belief

Emotions

Norms

Values

Public Knowledge

Private Knowledge

How do the students co-construct and reinvest micro-units of Knowledge-Belief?

- Temporal tracking (Transana)
  Training, YouTalk pedagogical sequence

- Spatio-communicative specificity
  Group discussion on quiz elucidation
  Class explanation of correct answer
  Group debate about an opinion question (OQ)
  Class debate on an OQ
  Group and class debate about the MQ

- Multimodal characterization (ELAN)
  Verbal, lexical elements
  Gesture features
  Use of material environment

- Functions
  Relation to speech
  “Record” status

- Emergence and Trajectory Features
  Knowledge-Specific?

- Focus on units of different epistemic status
  - Knowledge piece specific to environmental education aiming at changing practices with new conceptions “Virtual water”: water for the production of other goods
  - 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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