### Supplementary Material

<table>
<thead>
<tr>
<th>Codes</th>
<th>Code Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Arrangement</td>
<td>e.g., audio recorder number, where to put computer, who is 'clicking'</td>
</tr>
<tr>
<td>School [not sim or polarity related]</td>
<td>e.g., homework, lab, tutors, readings. Includes discussing non-chemistry courses.</td>
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<tr>
<td>Polarity</td>
<td>e.g., sim, polarity, related topics</td>
</tr>
<tr>
<td>Other</td>
<td>anything that doesn’t fit into other categories</td>
</tr>
<tr>
<td>Instructor Student Discussion [on polarity]</td>
<td>conversation where instructor is talking to a student about the topic</td>
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</tbody>
</table>

### General Notes on Coding:

<table>
<thead>
<tr>
<th>Length:</th>
<th>Discussion segment must be “at least” 2 consecutive speakers in length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For example, ‘other’ utterances of only one line (one speaker) are coded as the line (speaker) immediately preceding</td>
</tr>
<tr>
<td>Incomplete comments:</td>
<td>If a speaker’s comment is unclear (for example “You…”), code as the line immediately preceding</td>
</tr>
</tbody>
</table>

### Getting Context:

<table>
<thead>
<tr>
<th>Comments on multiple topics:</th>
<th>For individual student comments that include more than one topic:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario</td>
<td>Code As:</td>
</tr>
<tr>
<td>If there is any ‘other’ component...</td>
<td>Other</td>
</tr>
<tr>
<td>If no ‘other’, but there is ‘group arrangement’...</td>
<td>Group Arrang.</td>
</tr>
<tr>
<td>If no ‘other’ and no ‘group arrangement’, but there is ‘school’...</td>
<td>School</td>
</tr>
</tbody>
</table>

### Segmenting Instructor-student conversation:

<table>
<thead>
<tr>
<th>For instructor-student on-topic discussions:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>If a student has ‘polarity’ parts of one comment with asking for help from the instructor, start the segment with the instructor’s response. (not with the student’s question).</td>
<td></td>
</tr>
<tr>
<td>End segment when instructor makes last response. If after the instructor’s last response, the student is still clearly speaking to instructor, include that. Otherwise, segment ends with end of instructor talking.</td>
<td></td>
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</tbody>
</table>
Example Transcripts

Each transcript below contains one transcript recorded during the 10-minutes observation time.

Example 1 contains:
Total Utterances: 44
Total Conversation Segments: 2
Conversation Segments Consists of:
1 Group Arrangement Discussion Segment
1 Varically Discussion Segment

Utterance | ESI Script | Discussion Segment Code
---|---|---
1. I think it's important to... it should be... if you see... | Group Arrangement
2. It's... let's assume... | Fidelity
3. I didn't see what... it's... it's... it's... | Group Arrangement
4. But I... I just... | Fidelity
5. I see... I see... I see... | Group Arrangement
6. I see it... I see... it's... | Fidelity
7. It's... it's... it's... | Group Arrangement
8. It's... it's... it's... | Fidelity
9. It's... it's... it's... | Group Arrangement
10. It's... it's... it's... | Fidelity
11. It's... it's... it's... | Group Arrangement
12. It's... it's... it's... | Fidelity
13. It's... it's... it's... | Group Arrangement
14. It's... it's... it's... | Fidelity
15. It's... it's... it's... | Group Arrangement
16. It's... it's... it's... | Fidelity
17. It's... it's... it's... | Group Arrangement
18. It's... it's... it's... | Fidelity
19. It's... it's... it's... | Group Arrangement
20. It's... it's... it's... | Fidelity
21. It's... it's... it's... | Group Arrangement
22. It's... it's... it's... | Fidelity
23. It's... it's... it's... | Group Arrangement
24. It's... it's... it's... | Fidelity
25. It's... it's... it's... | Group Arrangement
26. It's... it's... it's... | Fidelity
27. It's... it's... it's... | Group Arrangement
28. It's... it's... it's... | Fidelity
29. It's... it's... it's... | Group Arrangement
30. It's... it's... it's... | Fidelity
31. It's... it's... it's... | Group Arrangement
32. It's... it's... it's... | Fidelity
33. It's... it's... it's... | Group Arrangement
34. It's... it's... it's... | Fidelity
35. It's... it's... it's... | Group Arrangement
36. It's... it's... it's... | Fidelity
37. It's... it's... it's... | Group Arrangement
38. It's... it's... it's... | Fidelity
39. It's... it's... it's... | Group Arrangement
40. It's... it's... it's... | Fidelity
41. It's... it's... it's... | Group Arrangement
42. It's... it's... it's... | Fidelity
43. It's... it's... it's... | Group Arrangement
44. It's... it's... it's... | Fidelity

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Example:

1. What can you reason about?
   - Consequence: Can you explain why it is true?
   - Strategy: Use the table to reason about...

2. How do you know what you know?
   - Consequence: Can you provide evidence for your reasoning?
   - Strategy: Use the table to compare...

3. How do you know what you know?
   - Consequence: Can you explain the relationship between...
   - Strategy: Use the table to reason about...

4. How do you know what you know?
   - Consequence: Can you justify your conclusion?
   - Strategy: Use the table to reason about...

5. How do you know what you know?
   - Consequence: Can you explain the relationship between...
   - Strategy: Use the table to reason about...

6. How do you know what you know?
   - Consequence: Can you justify your conclusion?
   - Strategy: Use the table to reason about...

7. How do you know what you know?
   - Consequence: Can you explain the relationship between...
   - Strategy: Use the table to reason about...

8. How do you know what you know?
   - Consequence: Can you justify your conclusion?
   - Strategy: Use the table to reason about...

9. How do you know what you know?
   - Consequence: Can you explain the relationship between...
   - Strategy: Use the table to reason about...

10. How do you know what you know?
    - Consequence: Can you justify your conclusion?
    - Strategy: Use the table to reason about...