

Student Discourse Networks and Instructor Facilitation in Process Oriented Guided Inquiry Physical Chemistry Classes

Electronic Supplementary Material (ESI)

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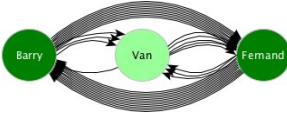
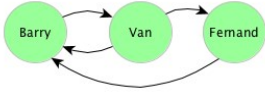
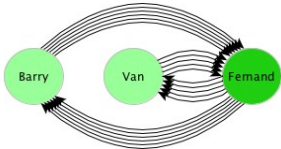
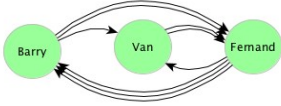
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Network graphs and measures for student turn-taking for each episode from seven transcripts.

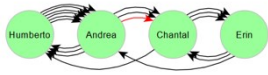
Course I: Team Alpha (α) – Day 1

Episode	Measures	Graph
<i>clicker question; lecture</i>		
1	Duration: 1.15 min Total edge frequency: 15.65 On-topic edge frequency: 15.65 Centralization: 1.00 Reciprocity: 0.67	
<i>Instructor-team interaction</i>		
2	Duration: 6.78 min Total edge frequency: 10.76 On-topic edge frequency: 10.76 Centralization: 0.00 Reciprocity: 1.00	
<i>whole class discussion; lecture</i>		
3	Duration: 2.57 min Total edge frequency: 11.69 On-topic edge frequency: 11.69 Centralization: 0.50 Reciprocity: 0.67	

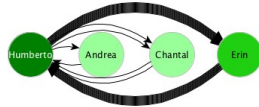
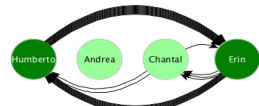
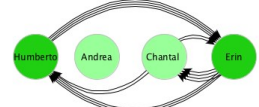
<i>whole class discussion; lecture</i>		
4	Duration: 5.08 min Total edge frequency: 6.69 On-topic edge frequency: 6.69 Centralization: 0.00 Reciprocity: 1.00	
<i>White board display; whole class discussion</i>		
5	Duration: 1.08 min Total edge frequency: 3.70 On-topic edge frequency: 3.70 Centralization: 0.50 Reciprocity: 0.33	
<i>whole class discussion; lecture</i>		
6	Duration: 3.00 min Total edge frequency: 7.33 On-topic edge frequency: 7.33 Centralization: 1.00 Reciprocity: 0.67	
<i>Instructor-team interaction; whole class discussion; lecture</i>		
7	Duration: 2.42 min Total edge frequency: 3.72 On-topic edge frequency: 3.72 Centralization: 0.50 Reciprocity: 0.67	
<i>class ends</i>		

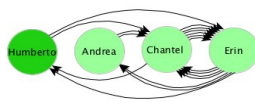
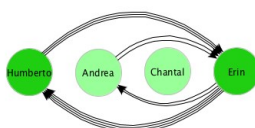
Course I: Team Beta (β) - Day 1

Episode	Measures	Graph
<i>clicker question; lecture</i>		
1	Duration: 8.08 min Total edge frequency: 7.05 On-topic edge frequency: 7.05 Centralization: 0.00 Reciprocity: 1.00	
<i>clicker question</i>		
2	Duration: 3.98 min Total edge frequency: 14.81 On-topic edge frequency: 14.81 Centralization: 0.33 Reciprocity: 0.67	
<i>Lecture; whole class discussion</i>		
3	Duration: 6.60 min Total edge frequency: 10.76 On-topic edge frequency: 10.76 Centralization: 0.50 Reciprocity: 0.67	
<i>White board display; lecture; whole class discussion; Instructor-team interaction</i>		
4	Duration: 1.30 min Total edge frequency: 16.15 On-topic edge frequency: 16.15 Centralization: 0.33 Reciprocity: 0.17	
<i>whole class discussion; lecture; clicker question; Instructor-team interaction</i>		
5	Duration: 3.00 min Total edge frequency: 9.33 On-topic edge frequency: 9.33 Centralization: 0.17 Reciprocity: 0.83	
<i>lecture</i>		

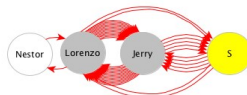
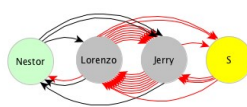
6	Duration: 5.03 min Total edge frequency: 3.77 On-topic edge frequency: 3.57 Centralization: 0.17 Reciprocity: 0.33	
<i>whole class discussion; lecture; clicker question</i>		
<i>Class ends</i>		

Course I: Team Beta (β) - Day 2

Episode	Measures	Graph
<i>clicker question; whole class discussion; lecture</i>		
1	Duration: 5.15 min Total edge frequency: 6.41 On-topic edge frequency: 6.41 Centralization: 1.00 Reciprocity: 0.50	
<i>Instructor-team interaction; lecture</i>		
2	Duration: 2.87 min Total edge frequency: 10.81 On-topic edge frequency: 10.81 Centralization: 0.50 Reciprocity: 0.33	
<i>whole class discussion</i>		
3	Duration: 2.17 min Total edge frequency: 6.92 On-topic edge frequency: 6.92 Centralization: 0.50 Reciprocity: 0.33	
<i>whole class discussion; lecture</i>		

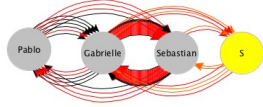
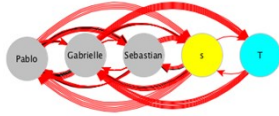
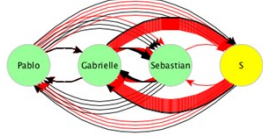
4	Duration: 2.63 min Total edge frequency: 6.84 On-topic edge frequency: 6.84 Centralization: 0.33 Reciprocity: 0.50	
<i>lecture; whole class discussion</i>		
5	Duration: 1.07 min Total edge frequency: 10.31 On-topic edge frequency: 10.31 Centralization: 0.67 Reciprocity: 0.33	
<i>Instructor-team interaction; whole class discussion; team quiz</i>		
<i>class ends</i>		

Course II: Team Gamma (γ) - Day 1

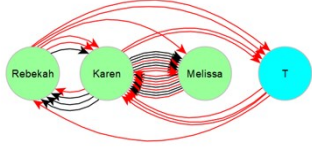
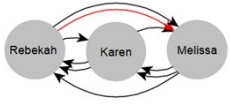
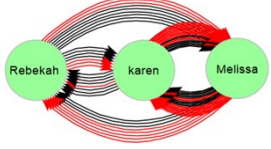
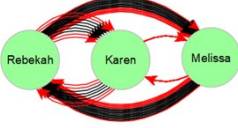
Episode	Measures	Graph
<i>clicker question; lecture</i>		
1	Duration: 2.18 min Total edge frequency: 19.69 On-topic edge frequency: 00.00 Centralization: 0.67 Reciprocity: 0.67	
<i>lecture</i>		
2	Duration: 1.92 min Total edge frequency: 15.65 On-topic edge frequency: 2.60 Centralization: 0.33 Reciprocity: 0.83	
<i>Instructor-team interaction</i>		

3	Duration: 8.12 min Total edge frequency: 14.91 On-topic edge frequency: 3.00 Centralization: 0.50 Reciprocity: 0.67	
<i>lecture</i>		
4	Duration: 5.22 min Total edge frequency: 10.35 On-topic edge frequency: 4.00 Centralization: 0.67 Reciprocity: 0.50	
<i>lecture</i>		
5	Duration: 4.18 min Total edge frequency: 11.00 On-topic edge frequency: 1.70 Centralization: 0.33 Reciprocity: 0.50	
<i>Instructor-team interaction</i>		
6	Duration: 5.97 min Total edge frequency: 14.58 On-topic edge frequency: 1.00 Centralization: 0.67 Reciprocity: 0.67	
<i>lecture</i>		
7	Duration: 7.88 min Total edge frequency: 12.18 On-topic edge frequency: 1.80 Centralization: 0.33 Reciprocity: 0.83	
<i>Instructor-team interaction</i>		
8	Duration: 2.37 min Total edge frequency: 15.63 On-topic edge frequency: 10.55 Centralization: 0.67 Reciprocity: 0.67	
<i>class ends</i>		

Course II: Team Delta (δ) - Day 1

Episode	Measures	Graph
<i>clicker question; lecture</i>		
1	Duration: 2.15 min Total edge frequency: 10.23 On-topic edge frequency: 1.43 Centralization: 0.00 Reciprocity: 1.00	
<i>lecture</i>		
2	Duration: 10.32 min Total edge frequency: 11.73 On-topic edge frequency: 5.80 Centralization: 0.33 Reciprocity: 0.67	
<i>lecture</i>		
3	Duration: 5.20 min Total edge frequency: 14.81 On-topic edge frequency: 3.70 Centralization: 0.33 Reciprocity: 0.83	
<i>lecture</i>		
4	Duration: 10.27 min Total edge frequency: 15.88 On-topic edge frequency: 2.10 Centralization: 0.33 Reciprocity: 0.80	
<i>lecture</i>		
5	Duration: 10.58 min Total edge frequency: 18.24 On-topic edge frequency: 4.90 Centralization: 0.00 Reciprocity: 1.00	
<i>Class ends</i>		

Course II: Team Epsilon(ϵ) - Day 1

Episode	Measures	Graph
<i>Clicker question, lecture</i>		
1	Duration: 2.13 min Total edge frequency: 0.00 On-topic edge frequency: 00.00 Centralization: undefined Reciprocity: 0.00	
<i>lecture</i>		
2	Duration: 10.52 min Total edge frequency: 3.14 On-topic edge frequency: 1.24 Centralization: 0.5 Reciprocity: 0.67	
<i>lecture</i>		
3	Duration: 5.10 min Total edge frequency: 1.76 On-topic edge frequency: 1.57 Centralization: 0.00 Reciprocity: 1.00	
<i>lecture</i>		
4	Duration: 10.48 min Total edge frequency: 7.82 On-topic edge frequency: 3.90 Centralization: 0.00 Reciprocity: 1.00	
<i>lecture</i>		
5	Duration: 15.50 min Total edge frequency: 9.23 On-topic edge frequency: 4.70 Centralization: 0.00 Reciprocity: 1.00	
<i>class ends</i>		

Course II: Team Epsilon(ϵ) - Day 2

Episode	Measures	Graph
<i>Clicker question, lecture</i>		
1	Duration: 10.22 min Total edge frequency: 7.63 On-topic edge frequency: 7.63 Centralization: 0.00 Reciprocity: 0.33	
<i>lecture</i>		
2	Duration: 12.08 min Total edge frequency: 7.45 On-topic edge frequency: 6.12 Centralization: 0.50 Reciprocity: 0.75	
<i>Lecture, clicker question</i>		
3	Duration: 7.80 min Total edge frequency: 8:46 On-topic edge frequency: 6.67 Centralization: 0.33 Reciprocity: 0.50	
<i>Instructor-team interaction</i>		
4	Duration: 13.70 min Total edge frequency: 11:17 On-topic edge frequency: 2.77 Centralization: 0.00 Reciprocity: 0:33	
<i>class ends</i>		