Lens To Learning

Class-wide video analysis of Peer Instruction discussions Laura Tucker, Todd Zickler, Ruonan Li, Rachel Scherr, and Eric Mazur

GROUF

In Peer Instruction, students discuss conceptual questions



We have fine-grained analysis of some conversations, but students are selected for conversation analysis



James & Willoughby, *Am. J. Phys.*, 2011; Knight & Wise, <u>http://blog.sciencegeekgirl.com/2013/04/05/understanding-clicker-discussions/</u>, 2013

We have student clicker responses, but that doesn't reflect whether they discuss



Current techniques miss students who don't participate







Current techniques don't allow us to track a single student's behavior over time









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If we identify under-participators and investigate causes, we can do more to encourage participation (for at least some)









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To whom are students talking (and how does grouping affect participation)?

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How much are students talking on-topic vs. off-topic?





We need video that can show many students



1. Participation

We need video that can show many students and "zoomed-in audio" to determine conversation content



1. Participation

We implemented a discrete, comprehensive recording system



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We call this recording system Lens To Learning



1. Participation

Our vision: automate analysis with computer vision



1. Participation 2. New measurement

Our vision: automate analysis with computer vision





1. Participation 2. New

2. New measurement

Our vision: automate analysis with computer vision







1. Participation 2. New



Computer vision systems have to be "trained" with human-labeled video



3. Vision



Alice Blake Emily Grant Nourhan

Not pictured: Lizzy, Sean, and Thomas

1. Participation

Coders mark for <u>each student</u> at each time:

Time	Interaction type	ON/OFF-topic	Partners
0:01:00	NONE		
0:01:05	NONE		
0:01:10	NONE		
0:01:15	PEER	ON	D104,D105
0:01:20	PEER	ON	D104,D105
0:01:25	PEER	ON	D104,D105
0:01:30	PEER	ON	D104,D105
0:01:35	PEER	ON	D104,D105
0:01:40	PEER	ON	D104,D105
0:01:45	INSTRUCTOR	ON	D104,D105
0:01:50	INSTRUCTOR	ON	D104,D105
0:01:55	PEER	ON	D104,D105
0:02:00	PEER	ON	D104,D105
0:02:05	PEER	OFF	D104,D105
0:02:10	PEER	OFF	D104,D105
0:02:15	PEER	ON	D104,D105
0:02:20	PEER	ON	D104,D105
0:02:25	NONE		
0:02:30	NONE		

1. Participation 2. New

2. New measurement

Outcome: Discussion profile for multiple questions



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What we've learned so far

3. Vision

1. Very little time off-topic (<10%)

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Applications

- * Success measure for ConcepTests
- * Determining best practices over range of courses

3. Vision

Future applications

* Find students who under-participate

1. Participation

* See how student groupings change participation

2. New measurement



1. Participation 2. New measurement



1. Participation 2. N

2. New measurement





1. Participation 2. New

2. New measurement



In tutorial data, no loss of accuracy in coding without sound.

3. Vision

Discovery conversation (ConcepTest asked)

10 A initially flows through a light bulb. How much current flows through the bulb when a wire is connected across the bulb as shown?



1. Participation 2. New measurement

Discovery conversations

Tammy	0	So if you think that all the current will flow through the wire, the current that flows through the bulb would be zero.
Sharon	10	OK, my thing is that he just showed us when you put two things in parallel the current can still flow through both of them, so

1. Participation

2. New measurement

Discovery conversations



1. Participation

2. New measurement

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