

Supporting class discussion through live notification and personal pedagogical training

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Motivation

Abstract

Active participation in class discussion increases student motivation, engagement, and information synthesis. However, American undergraduates experience mostly passive lectures because it is hard to produce conversation in large classrooms. Accompanying recitation courses are smaller, but usually follow this same lecture model. The student teachers who lead recitations are domain experts, but without pedagogical training. Teaching support requires attending voluntary workshops and consultations, which are removed from the classroom and take extra time. Our research uses online Teacher Professional Development, classroom sensors, live notifications, and teacher reflections to give novice instructors timely support for increasing student participation. It introduces pedagogical concepts that reflect each instructor's data. Participants have begun moving beyond passive lecture by asking better questions and adopting new discursive tactics (which they previously said they would not do). Going forward, the work aims to generalize its approach to any domain and community of practitioners.

Too much lecture

The lecture model is dominant in American universities

Participation improves learning
.47 sd grade boost. More failure in lecture courses (34% vs. 23%).

Freeman et al, 2014: Meta-analysis of 255 undergrad studies

Higher attendance and engagement
Rocca, 2010; Deslauriers et al, 2011

Discussion (asking questions, raising hands, making comments):
Improves critical thinking
Bean, 1994; Rocca, 2010

Definitions

Active learning: Activities and/or discussion in class, as opposed to passively listening to an expert.

Lecturing: Continuous exposition by the teacher.

Active participation: Asking questions, raising hands, making comments.

Research approach

Research questions

How can we support instructors right when they need it?

What is happening in American recitation classes?

Would live notifications help them to adopt better teaching tactics?

How would brief, just-in-time, personal, online training help them improve?

Research to date

Study 1. Interviews with 15 recitation instructors, 2014

- Novice teachers with expertise in content
- All international students, affording unique perspectives on American classroom culture
- Asked about perspectives on teaching and expectations on students

Study 2. Field Study, 2015

Class observations and interviews with 5 recitation instructors

- 32 hours of live observations
- Multiple interviews on teaching experience and perspectives
- Direct questioning about discursive tactics

Study 3. Live Notification Design Study, 2015

- 30 hours of real-time classroom w/intervention
- Peripheral display of speech events and wait-time support for TAs

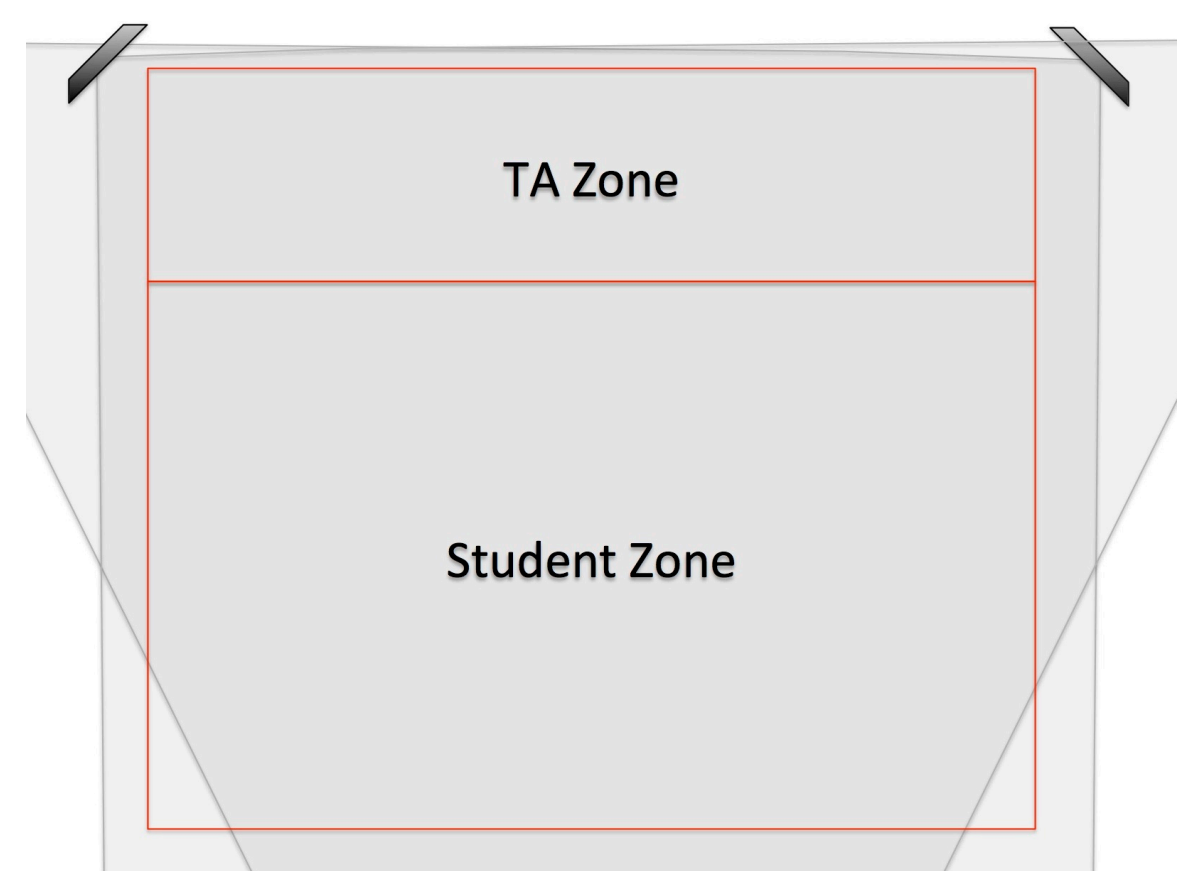
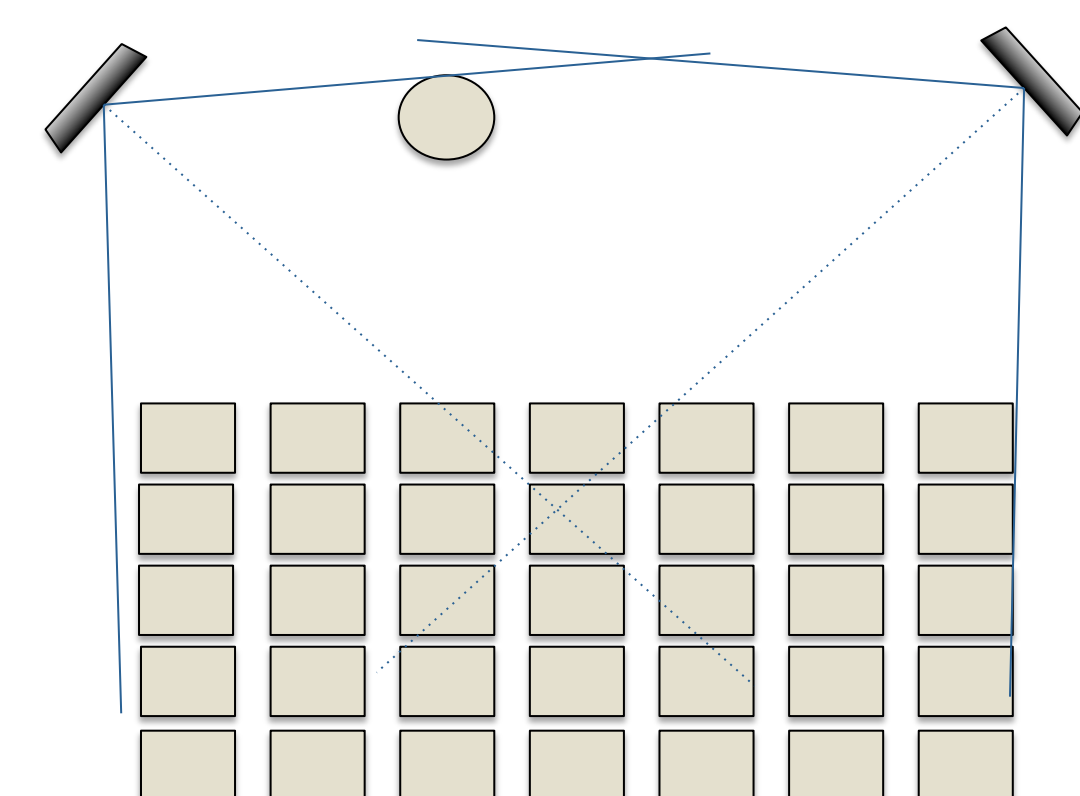
Study 4. Online PD for TAs, Design-Based Research, 2016

- 10 TAs over 7 weeks of teaching with weekly online learning activities
- Live observation of 5 TAs over 10 weeks
- Learning to think of questions as "open" and "closed," planning specific questions for upcoming classes
- Explicit learning about strategies

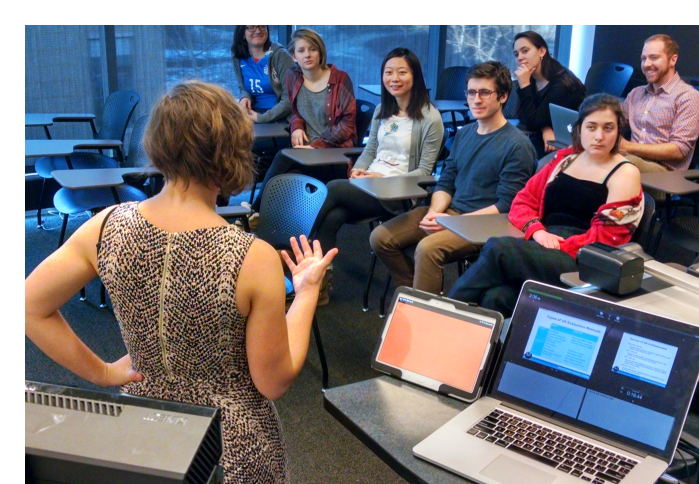
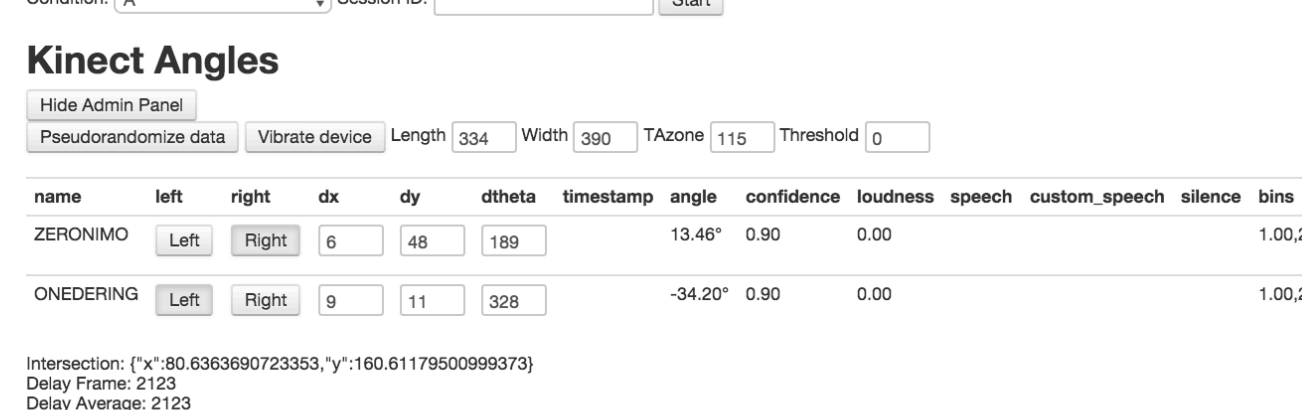
Tools

Setup

2 Kinects
Send data to server
Client calculation of TA/Student position



Output



Findings

Studies 1 and 2: Interviews and field observations

Gerritsen et al., 2014, 2015

Interviews with and observations of 20 recitation instructors

- Novice teachers who have all had undergraduate education in a different cultural context.

Live Classroom Field Study

- TA talk filled 92% of class time (SD=3.6%)
- Student talk filled 5.25% (SD=2.3%)
- Time with no talk filled the remaining time (M=2.75%)
- Instances of student talk had an average duration of 6.2 seconds (Median=3.4, SD=12.6).

Trends in TA perspectives of classroom discussion.

Asking questions

- "It's usually just me talking and them listening. ... I don't really know what they're picking up."
- "Probably, I should, like, ask more times if they have questions."
- "The recitation is supposed to cover what the professor taught and not ask too many questions to the students."
- "Maybe I might want to involve their participation a bit more than what it is, but I also fear by doing so, if they'll be able to complete the [assignment]..."

- "[I] keep asking if there are any questions but ... no one speaks, so I cannot help this one."
- "You can't influence [student participation] to a very high degree ..."

Calling on students

- "I think it's plausible [to cold call students], but I won't do it because, like, if you're calling someone, then the entire class knows, when the professor calls the student's name, this person is not answering..."

Using students' names

- "I think it's not that important to remember names."
- "I don't remember the names actually, so I cannot [use] them..."
- "...I won't use [their names] in the class ... because I have no reason to call them by name."
- "...if you try to address students by name, you should probably think of knowing perhaps everybody's names, so that every student feels that they are equally treated within the class, and some students do not think that, 'He knows his name so maybe he knows he's a better student than I am.'"

Study 3: Live notifications

Live notifications

- Wait time (after teachers/students speak) is good for students
- Teachers will increase wait time with visual notification of passing time
- Students will talk more
- Will it work at the university level with novice TAs?

Results

- TAs wait longer, and...
- Student speak more often, but...
- Overall student participation still low

Study 4: Design-based research for online PD

Positive Changes

- TAs planned recitations sooner
- Perspective shifts from "getting through the material" to thinking about questions and interactions

Positive toward approach

- Liked getting weekly activities
- Liked seeing what colleagues contributed

Remaining Questions

- Do the question types matter for creating change in class?
- What happens if approach is made into a system?

Remaining Questions

- Do the question types matter for creating change in class?

Coming steps

Other sensors to employ



Live face detection in class (Dalal & Triggs, 2005)



Live hand detection in class (Yao & Cooperstock, 2002)

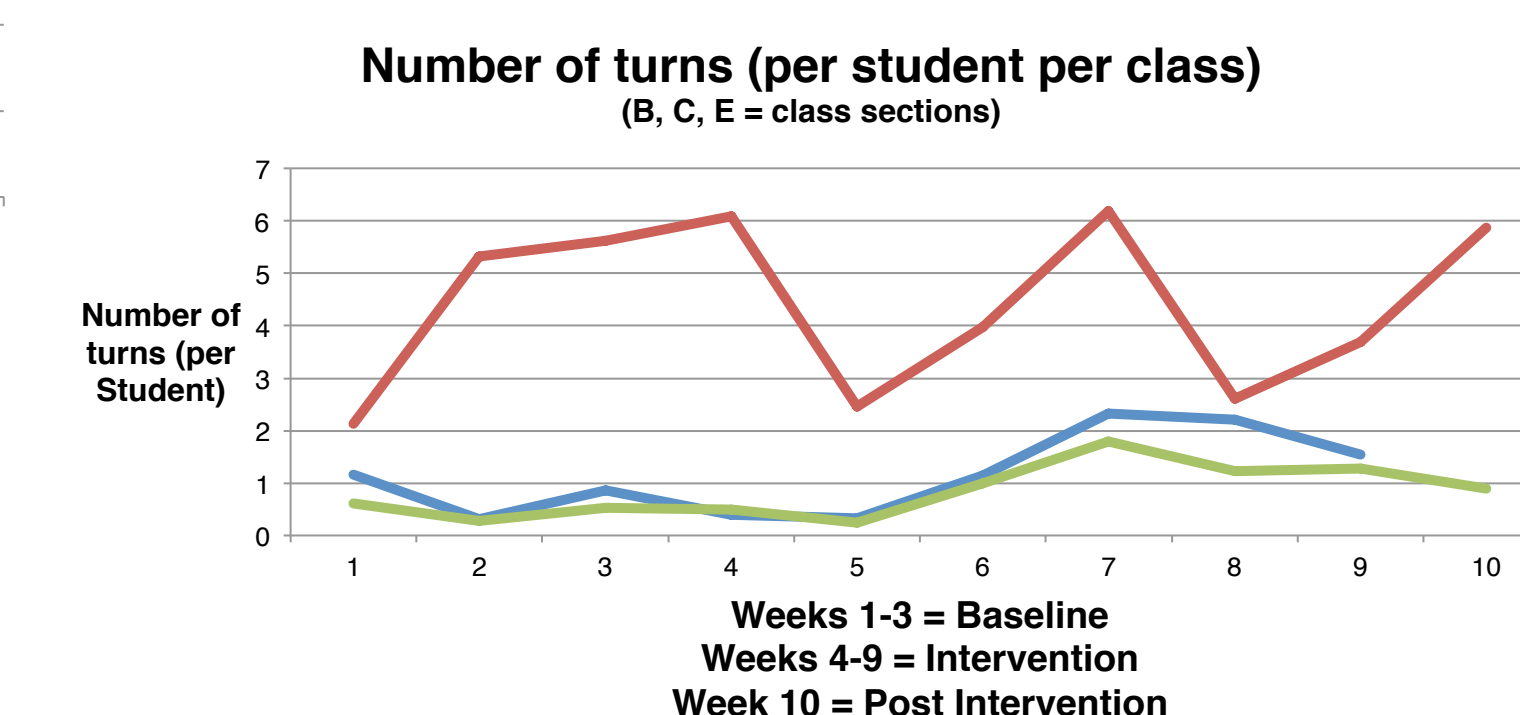
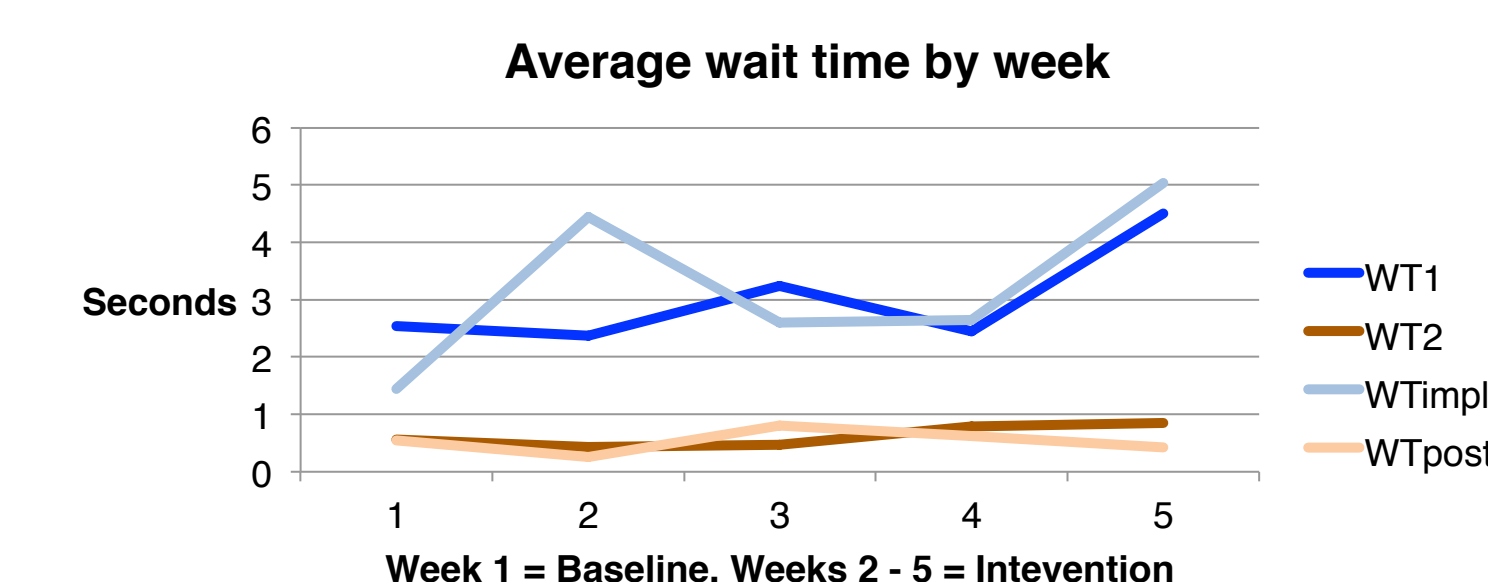
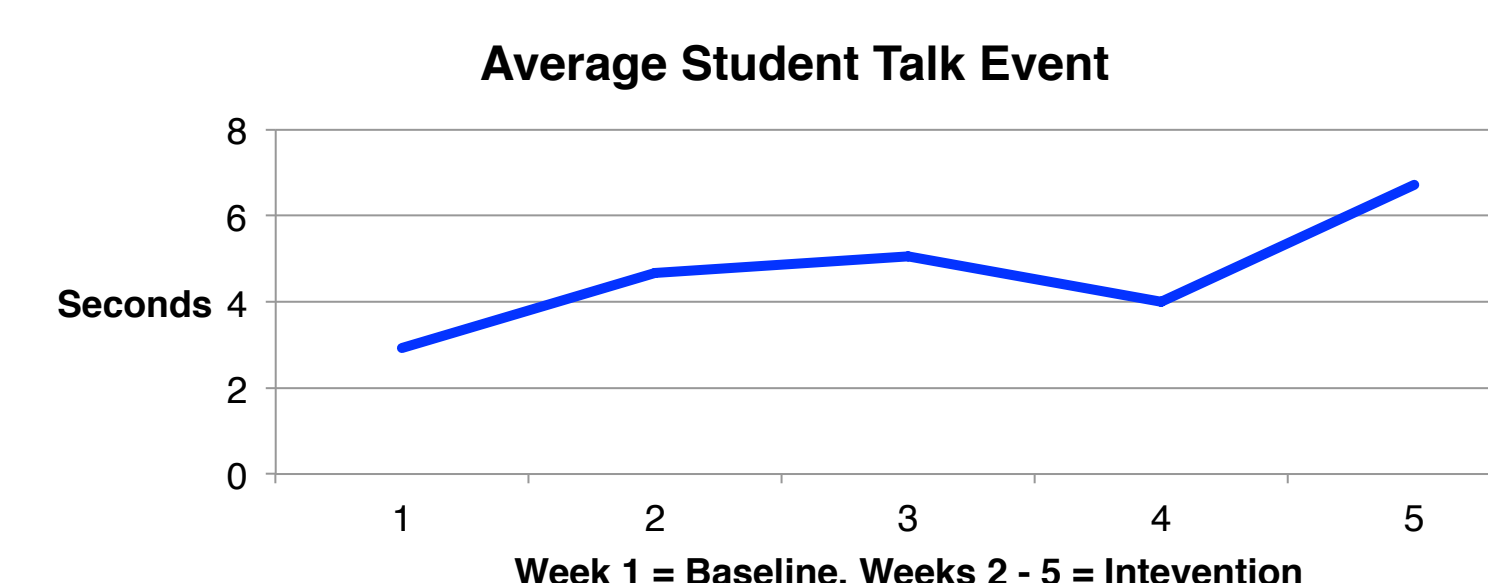
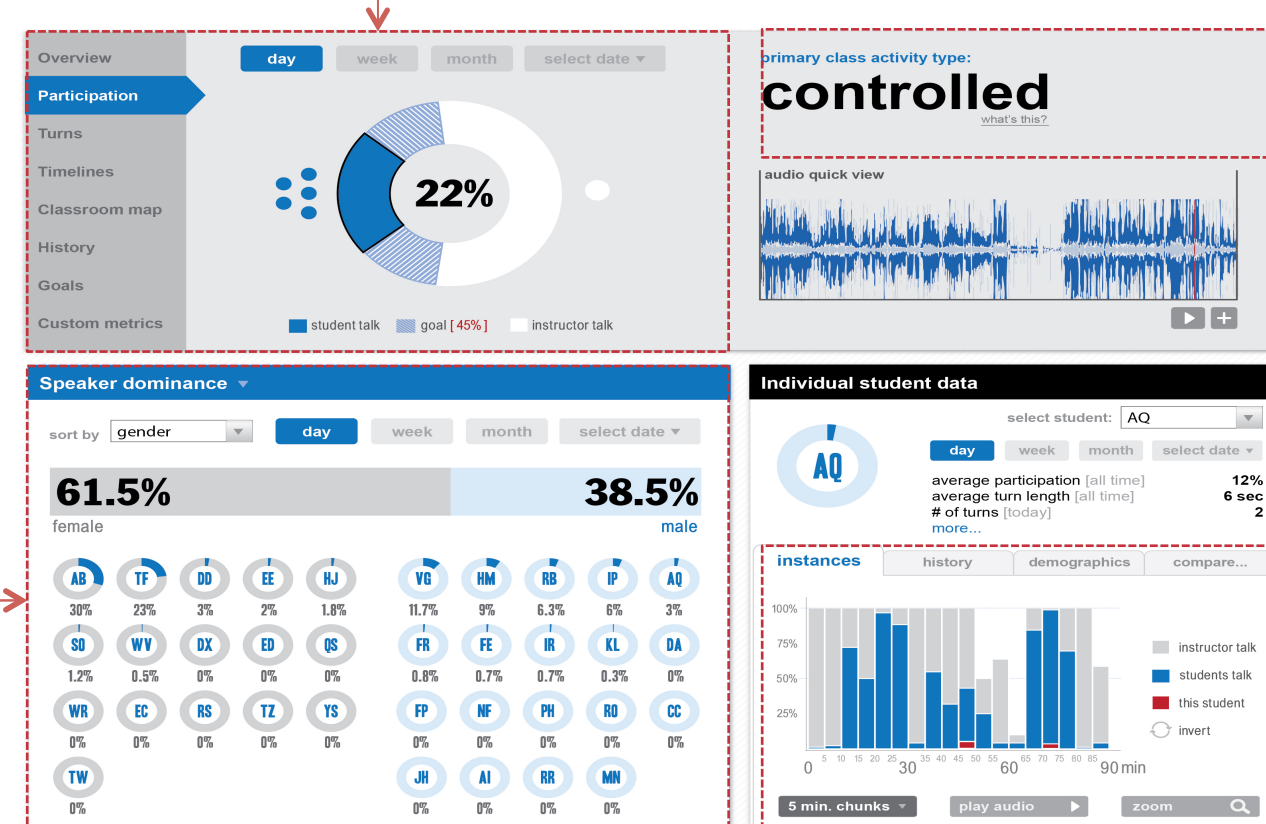
Dashboard for teachers

Class activity type

Instructors—Students

Student representativeness

Student dominance



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