

Quantifying student behavioral engagement based on teaching practices in a large class

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Introduction:

Due to high student enrollments and limited resources, large classes are common at many universities. In large lectures, students are likely to experience a sense of anonymity, passivity, and distraction leading to decreased behavioral engagement in class. It is therefore not surprising that one of the biggest concerns of many instructors is how to effectively teach large classes. The purpose of this work was to develop an objective, quantitative classroom observation protocol that evaluates how teaching practices affect student behavioral engagement in large classes.

Observation protocol:

1. Obtain lesson plan from instructor (e.g. PowerPoint file) ahead of time
2. Divide large classroom into sections
3. Sit among students, changing sections daily
4. Each day, select 10 students to observe. Criteria: an unobstructed view of each student's face, computer screen, and notes
5. Every few minutes, observe each student for 2-10 seconds and record the following information directly in the instructor's lesson plan (e.g. the "Notes" section of a PowerPoint file):
 - Time
 - Number of students engaged, based on criteria in Table 1
 - Classroom activity at the time (e.g. clicker, in-class discussion, lecture)
 - Any relevant instructor actions (e.g. Socratic questioning, humor, real-world examples)
 - Any extenuating circumstances (e.g. classroom temperature, technical issues)
6. Record time of any instructor questions to the class and any student questions to the instructor, including from which section of the room the question/answer came
7. Provide observation data to instructor

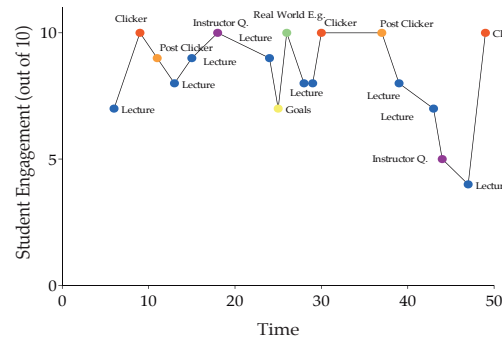
Table 1

	Engaged	Disengaged
Listening	Student is looking at the instructor and is responsive to the lecture (e.g. nods in agreement, their eyes are following notes)	Settling in/packing up Student is unpacking, downloading class material, organizing notes, finding seat or packing up and leaving classroom
Writing	Student is taking notes on in-class material, they are annotating pre-printed notes or writing when instructor stresses something of importance	Unresponsive Student is not responsive to lecture (e.g. they are sleeping or day dreaming, their eyes are not following lecture notes and they are unresponsive to instructor questions or cues)
Reading	Student is following along with class, reading slides or pre-printed notes. Or student is reading ahead when asked a question	Off-task Student is working on homework or studying for another course, playing with phone, listening to music, or reading non-class related material
Engaged computer use	Student is following along with lecture on computer or taking class notes in a word processor or on the presentation	Disengaged computer use Student is surfing web, playing game, chatting online, checking e-mail
Engaged student interaction	Student is engaging with other students about class material (listening or explaining) (e.g. they are using hand gestures, pointing at notes, or you can overhear them discussing material)	Disengaged student interaction Student is engaging with other students about non-class related material (e.g. they are laughing, there is a constant back and forth between students, or a conversation is overheard)
Engaged interaction with instructor	Student is asking or answering a question or participating in in-class discussion	Distorted by another student Student is observing other student(s) and is distracted by an off-task conversation or by another student's computer or phone

Results from a large introductory oceanography course:

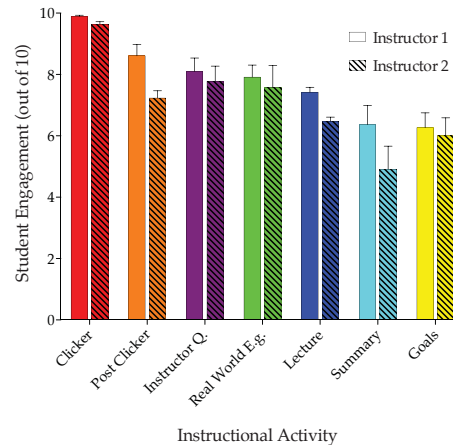
Classroom observations were conducted during 27 lectures in a first year Oceanography course with an enrollment of 170 students and two course instructors. The observer sat in one of nine sections in the classroom, and obtained observations from each section at least three times in the semester. A total of 720 engagement observation points were recorded through the semester.

Figure 1: Student engagement over a lecture period based on teaching activities



Data from a typical class period reveal activities that are more and less engaging for students (Figure 1). The instructor also gets a snapshot of what student engagement looked like over the 50-minute lecture period and can easily see where to make changes.

Figure 2: Student engagement based on instructional activity averaged over the semester for each instructor



Overall observation data show that student engagement is strongly correlated to teaching practices. Two instructors with varying teaching experience show the same trends in student engagement based on teaching practices. On average, the most engaging activity is clicker questions and clicker question follow-up and the least engaging are instructor lecture, summaries, and learning goals.



What got student attention?

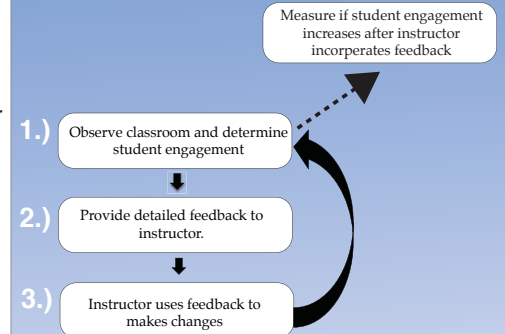
- Clicker questions
- In-class discussion
- Instructor walking around
- Student question repeated by instructor
- Real world examples



What didn't get student attention?

- Summary slide
- Out of context goals
- Long periods of lecturing
- Student question that is not repeated by instructor

Future Research:



Further information:

Please contact Erin Lane at elane@eos.ubc.ca for more information on this research

Educational Research happening in Department of Earth and Ocean Sciences at the University of British Columbia can be found at www.eos.ubc.ca/research/cwsei/

For more information on The Carl Wieman Science Education Initiative (CWSEI) at the University of British Columbia visit <http://www.cwsei.ubc.ca/>