

# Expanding Conversation – and Learning – in Our Classes

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I have come to believe that learning takes place through *conversation*, the blanket term I use for in-depth discussion and wrestling with ideas. Conversations take place between teachers and students; among students; within a student's mind while listening to the teacher in a lecture; or between students and authors. I believe that for a lecture (or any class) to be a successful learning experience for students, there *must* be conversation going on – otherwise anything the teacher says quickly dissipates. Here are some examples of how conversation can take place – or not – in lectures and seminars:

1. A college seminar: the teacher and some students speak (one at a time). Conversation is clearly taking place, and done well, this can lead to significant learning.
2. An invited guest speaker at a monthly university departmental colloquium: the speaker may be the only person in the room speaking for 50 minutes, but professors and graduate students in the audience are constantly engaging the speaker in questioning and conversing in their own minds. Such sessions help listeners learn a great deal.
3. A master orator speaking to a large audience: Consider Bill Clinton's speech at the 2012 Democratic Convention. He is such a powerful speaker that he can drag listeners by the scruff of the neck into full-blown conversation – they called out responses to him, cheered, clapped, laughed – and he responded to them. I suspect that many people listening to Clinton that night learned a lot and came away changed.
4. A poorly delivered introductory lecture delivered to hundreds of students: such lectures are an effective way to transfer information directly from the teacher's notes to the students' notes without passing through any active brain matter (apologies to whomever I am paraphrasing). Many students in these classes do not know how to engage in an internal conversation with the teacher, nor does the teacher invite students into a conversation. As a result, little learning takes place.

In short, conversation is essential – and can take many forms. There are several ways to increase the amount of conversation going on in our courses, even the largest classes:

- Question and answer with the whole class (teacher asks and one student answers)
- Students break into small groups to discuss a topic briefly, followed by a whole class discussion in which many students speak. This includes [Think-Pair-Share](#) and the Peer Instruction and “clickers” method developed by [Eric Mazur of Harvard](#).
- Conversation can also take place in writing, such as using first submissions (which get lots of comments from the teacher) and revised final submissions of the same paper; short reflective writing pieces can also be very effective.

**Other ways to increase conversation:** I have recently begun using three different techniques that have vastly increased the quantity and quality of the conversations that my students and I have *and* the conversations that my students have with each other. My students state strongly that these techniques – described below – have very positive effects on their learning.

### “Just-in-Time-Teaching”

Just-in-Time-Teaching has fundamentally changed my teaching practice. In this method students are expected to do the reading before class and to respond to a few questions based on the reading. They submit their responses electronically 12-24 hours before the class, and the teacher uses these responses as input for the upcoming session. As a result, the professor enters the classroom with a great deal of information about what the students do and do not understand and what they find intriguing. My students report (anonymously) that under this method they do the reading much more frequently and more deeply, and that they are better able to take part in classroom discussions. One of the developers of the technique describes it well here:

<http://webphysics.iupui.edu/jitt/what.html>.

There are a few different styles of responses:

- Multiple choice questions, which are easy to apprehend quickly (this the traditional Physics style, where this method originated, used to bring misconceptions to the surface)
- General purpose open-ended questions (e.g., *What did you find most confusing in the reading? What did you find most interesting?*) – excellent defaults that I often use
- Open-ended questions tailored to specific issues in a specific reading (very powerful).

I select 2-5 student comments that are especially fruitful – they may propose intriguing directions for discussion or highlight conceptual problems that several students encountered – and project these anonymously on the screen as discussion-starters.

There are many benefits to this system. Students are proud to see their thoughts shared with the entire class, and relieved that the difficulties they had with the reading are shared by others. In addition, I can highlight contributions from quieter students on the screen or by gently calling on them in class to share their thoughts, which they have already articulated. This method enables *all* of the students to contribute to the conversation, not just the usual suspects who are eager to raise their hands; such broad participation changes class dynamics significantly.

My students and I call these brief notes “Questions and Thoughts” or “QTs” (a more euphonious name than “JiTT”). Here are some comments that my students have made about QTs:

*When we first got them, I felt they were a little high school: ‘I gotta make sure you did the reading so here’s a question.’ Then I saw how much it helped me in discussion because I went in there with something in mind. The in-class discussion was much more colorful or active. I ended up really liking them. – Animal Behavior Student, 2011*

*At first, my QT responses were vague and less specific or significant. But over time, especially by your display of other students' QTs, I learned how to read better -- with more intention and quest for knowledge beyond the surface. It's a great way to help us analyze the readings, instead of just "doing" them, and I really like that the deadlines are the evening before the class. I'm very excited that we are making them public. It provides a new sort of class forum. – Ecology Student, 2012*

Here is a QT submission on “what was confusing in the readings” from a first-year student in my upper-level Ecology class. Note that she is not merely “doing the reading” – she also tries out possible responses to her queries and proposes them as further questions in her QT:

*On p.191, there is a quick example of stable equilibrium without oscillation showing a predator whose density decreases as its prey's density increases. What are possible causes of this? Does equilibrium suit the environment's available resources, and a large predator population is selected against?*

*Why don't predators have hump-shaped isoclines too? The orange/yellow diagram on p.193 (Fig. 11.14b). There must be a point where, even if there is enough prey to go around, there are too many predators (like the book said, territorial behavior and breeding spaces, etc., are limiting factors).*

*What might explain the hypotheses that generalist predators tend to cause stability and specialists tend to cause instability? Is it about more/less influence over one specific species' population?*

### **Notes on the QT process, as I use it:**

- In larger classes (40+ students) students write a QT every other class. These are not graded on quality; if students submit a certain number of thoughtful QTs (~10 for the semester), they get full credit for 5-8% of their final grade, although many submit more.
- If there is a TA, she reads and highlights the QTs before I see them, pointing out common trouble spots and especially interesting comments (this helps with quick turnaround!).
- Late in the semester I give students the option of sharing their QTs with the rest of the class, and students often start responding to others' comments in their own QTs.

I frequently feel humbled by the quality and honesty of my students' thoughts in these QTs. At times I find myself thinking that I cannot possibly do justice to all the ideas they are sharing with me – but QTs clearly help my students (and me) learn much more.

### **Learning Catalytics**

[Learning Catalytics](#) is a Web-based classroom response system in which the teacher poses a question and every student submits a response electronically on smart phones, tablets, or laptops. It is similar in form to classroom response systems such as classroom “clickers” and

PollAnywhere – but vastly more powerful. The teacher can create any of twenty different types of questions, each of which requires a different type of answer. These include (among others):

- Individual words that get assembled into a class-wide word cloud
- Long (or short) discursive answers
- Highlighting key phrases in a passage
- Mathematical statements
- Ranked choices
- Multiple-choice questions
- Sketches (e.g., on a map or graph)

Sketches are by far my favorite type of question, as students' thinking gets clearly revealed. Sketches can be displayed individually or overlaid to create a composite picture of the responses.

As the professor sees the students' answers in real time, she can project the answers and show them to the class or she can ask students to discuss their answers with neighboring students and then submit new answers. Learning Catalytics gives the professor immediate feedback on what students do and do not understand – and all students in the class get to engage in rich conversations about the topic at hand. Here is one student's response to Learning Catalytics:

*I am pretty blown away [with] how neat and effective Learning Catalytics has been for our class. It's extremely effective for our in class work, and it's awesome to be able to see so many student responses at one time. It's a great way for us to express what we understand and are struggling with without feeling like there's a right or wrong answer. It really help[s] to take the pressure off our learning, and instead brings the focus onto the material itself. I love the word clusters, and our live-time responses are super helpful in synthesizing material. ... I'm generally relatively "old school" with learning and don't like a lot of technology's invasion into the classroom. But the way we've been using learning catalytics has really changed my standpoint. When used thoughtfully and as a part of a greater learning structure, I find this online technological tool to be a huge help and supporter of the rest of our learning experience. – Ecology Student, 2012*

Student licenses cost \$12/semester or \$20/year and allow access to Learning Catalytics from an unlimited number of classes. The professor's license is free, and you can get a 30-day free trial that lets you and your students explore the system. If a student does not have a smartphone or laptop, she can write her answers on a note card and hand them in after class.

### **Question Formulation Technique (QFT)**

The in-class [Question Formulation Technique \(QFT\)](#) is essentially a structured brainstorming technique that helps students 1) explore the topic at hand in an unpressured, creative way and 2) develop their question-asking skills. Small groups of students are given a prompt (*not* a

question) and generate their own questions about the topic; these can be used in a number of different ways in class, including launching longer out-of-class assignments.

This year I used the QFT on the first day of class to see if the students could identify the key themes of the semester – and they did a great job of it. Here is a comment about the QFT:

*I think this method, although seemingly childish, was able to challenge our thinking process by returning to the basics of asking questions. I'm actually very glad we implemented this device because it was able to put me, and seemingly a lot of other students, in a place of thinking that was simple, yet immensely deep at the same time.*  
– Ecology Student, 2012

## **Conversation**

All three of these techniques vastly increase the quantity and quality of conversation taking place in a course. Just-in-Time-Teaching (or QTs) gives real insight into what students understand (and do not understand) so that the teacher enters the classroom having already begun a conversation with each of them. Learning Catalytics lets the teacher take the pulse of the class, and perhaps more importantly gives the students opportunities to make mistakes (in their initial response) and to teach others (when they discuss their responses in small groups). The Question Formulation Technique also allows students to make mistakes and try out ideas in a low risk manner (since they are merely asking questions in front of a small group of their colleagues, rather than assaying an answer in front of the entire class). They also feel strongly that they are shaping their own learning and the broader conversation in the class.

All of these techniques vastly increase the opportunities that students have to speak, to make mistakes, and to teach each other and the teacher – and – they take the locus of activity away from the teacher and move it to the students. If conversation is in fact an important part of learning (as I believe strongly) then classrooms in which many people simultaneously converse and wrestle with ideas can lead to tremendous learning.

To see Just-in-Time-Teaching in action, click here and answer a couple of quick questions:

<https://docs.google.com/a/brandeis.edu/spreadsheet/viewform?fromEmail=true&formkey=dENQVVRfZG0yYkZRZS1zbDMwT3hnYkE6MA>