

Opening Lines of Dialogue: Facilitating Questions and Discussions in Small and Large Classrooms

Jenna G. Tichon

University of Manitoba

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Outline

- ① The Need for Feedback and Response
- ② Daily Reflections
- ③ Scaling to a Large Class
- ④ One-Minute Papers
- ⑤ Other Small Activities
- ⑥ My Pitch

My Perspective is Objectively Bad

Four things on which we can agree:

- I was not a typical student
- I didn't have a typical relationship with my teachers
- I have a different frame of reference for what's "important" than my students
- I have a very different frame of reference for what's "obvious" than my students

To Other People I Am My Actions

“We are too prone to judge ourselves by our ideals and other people by their acts.” -Dwight Morrow

So a philosophy major and a statistics major walk into a bar...

Goals for Effective Dialogue in the Classroom

- Ensure the students have the opportunity to share their answers in a low stakes/pressure way.
- Praise the effort, not the quality.
- Be open to student feedback about what is and it not working.
- Acknowledge all feedback, particularly that which you aren't taking.

Summer 2015 I was hired to teach the Aboriginal Nursing Cohort section of STAT 1000.

- Approximately 25 students
- Generally lower incoming math skills
- Higher level of anxiety towards math
- Class met three times a week
- Extra class time and dedicated lab time on other days

Special Considerations

Need to be:

- Demonstrably empathetic
- Open to feedback
- Quickly identify misunderstandings to tailor teaching
- Allow students to bring up misunderstandings without needing to speak out

Journaling Activity

- Every class they would collect their “journal”
- At the end of class 5 minutes would be devoted to allowing them time to fill out the reflection
- After class I would read the journals and respond where needed
- At the start of the class I would address any common themes and tailor labs to the feedback

Journaling Take 2

I repeated the activity this summer with STAT 1150 which is a class with an obvious different skill set and a different set of needs. There were 17 students in the class. The reflections were the same and I handled the activity in an entirely identical fashion. Also ran 3 days a week.

Example

1. Name: [REDACTED]
2. Date: June 19th 2019
3. What is the most important thing that we learned today?

Correlation

$r_{xy} = r \cdot \left(\frac{sy}{sx} \right)$
is an alternative
formula

I hadn't seen
 $\text{cov}(x,y) / \text{var}(x)$ but napkin
algebra says it
makes sense to me.

4. What is one thing from today that you don't understand fully?

Would $B = \frac{\text{cov}(x,y)}{\text{var}(x)} = \frac{\text{SP}(y) \cdot \text{corr}(x,y)}{\text{SD}(x)}$

5. Is there anything else you'd like to tell me?

thank you for not checking
the answer for the clicker

100% streak continues!
You're welcome!

We have those in our
lect class

Example

1. Name: [REDACTED]
2. Date: May 15th
3. What is the most important thing that we learned today?

Probably

4. What is one thing from today that you don't understand fully?

I noticed that for our sample questions

to find the sample size, it was the

number of options ² \times 3 = 8
heads or tails

5. Is there anything else you'd like to tell me?

Everything's good!

$2^3 = 8$
 \uparrow
3 times is this true?

Yes. That's called
the basic counting rule

think you start w/ 2 branches,
those each spawn 2 for $2 \times 2 = 4$
branches. Those also spawn 2 for
11.0-0 branches. 4. In a diagram

Example

1. Name: [REDACTED]
2. Date: May 17
3. What is the most important thing that we learned today?
- that we can use the samples
and compare it to what we
are being told about the
population
4. What is one thing from today that you don't understand fully?
I am not sure if I fully understand the standard norm. distrib. of values from [REDACTED] and what it means compared to the regular.
standard normal is just a rescaling of values from any other normal distribution thanic u!
5. Is there anything else you'd like to tell me?
I think the story about your teacher is really cool and I wonder if you still keep in touch with him
I drop by to see him every few years. I need to drop him a line b/c he got a thank you in my PhD thesis.

Example

Daily STAT 1150 Feedback

1. Name: [REDACTED]
2. Date: May 18
3. What is the most important thing that we learned today?
 - That "random" in stats doesn't mean random
 - the prob. of an event is the sum of the outcomes that make up the event
4. What is one thing from today that you don't understand fully?
 - I think I understand everything
5. Is there anything else you'd like to tell me?
Nope

Differences Based on Demographic

The goal and use of the journals becomes very tailored to the student and the background of the class that you're using it with. Why I felt it most important for 1150 and most important for 1000 G01 was very different and that was clear in the use cases.

In general, students used the journals to do what they most needed them to do. I didn't worry too much about those that didn't put much effort in; students get out what they put in.

How I Use This Information

- Beginning of class reviews
- Understanding when something really needs a review or more examples
- Proactive about taking care of “non-content” issues, taking care of people first
- Create “important tips” sheets
- Inform future explanations
- Show myself as more “human”

Feedback

My most important message for this whole talk will always be to acknowledge the communication and beyond just writing responses back.

- Send class email if there was something incredibly pressing that they won't be able to complete homework without knowing
- Talk about common threads at the start of each class so they know others shared in them
- Share and praise insightful comments
- Tell them explicitly that their responses informed your review/quiz/practice session/start of class problem/etc...

We give time to the things we find valuable and that other people signal to us are valuable.

Extra Uses

- Used to distribute handouts
- Used to hand back assignments
- Used for small polls and class questions

Scaling Reflections to Large Classes

In my last two evening sections of STAT 1000 (Winter 2018 & 2019), I had 230-285 students and did the activity with them at the end of every class (once weekly).

Mechanics of Large Distribution

- Crowdmarked a class set of reflections with name on one side and reflection on the other
- At the start of class/break students picked up a sheet
- Given five minutes at the end of class to turn in and complete
- I “corrected” and commented on them through Crowdmark
- Students receive two marks towards iclicker for their submission
- The reflections are returned to students via email using Crowdmark

Example

1. What was one of the most important points from today's lecture?

Concept of "information management system" is very helpful.

2. Was there anything that you're unclear about from today's lecture?

Nope - all good!

Example

3. Is there anything else you would like to tell me?

Love the "Venn Diagram of Venn Diagrams"!

Is there someone in the department I could talk to about pre-requisites etc.? My only objective really is to take more and more interesting courses in stats... just a bit worried I'll get to a "dead end" because I'm missing a math or something. General studies advisors aren't terribly helpful thus far.

ALSO: I had forgotten about a lot of these Arrogant Worms!
Thanks !!.

Arrogant worms are the best! I would suggest going to sit down with Saman Muthukumarana, he's our undergrad chair. While I could help you pick interesting stats courses, he's the one that would know about pre-req stuff

Example

1. What was one of the most important points from today's lecture?

Working through the examples was very helpful as I was able to see patterns in my mistakes - almost exclusively missing negative signs (see #2... but I did it about 3 times.)

2. Was there anything that you're unclear about from today's lecture?

(In the fertility data workalong, we had a negative value, but I didn't get that in the math... did I do something wrong, or is there something in the videos that will help me understand this? (Just haven't had a chance to watch it yet & missed last week's lecture))

Ignore me, just realized I missed the sign on the sign! ☐

Example

3. Is there anything else you would like to tell me?

Thank you for addressing the talking - It's terribly distracting!! (And so rude...)

I will keep it up because it was bad enough
to be bothering me last time and that room
is super hard for me to hear talking.

Example

1. What was one of the most important points from today's lecture?

Central Limit Theorem → AAAAAA!!!
so am I right(ish?) to think that the more skewed
a non-normal distribution, the bigger n will have to be
before the distribution would "look" normal?

Yes!

2. Was there anything that you're unclear about from today's lecture?

No; going to take some time to digest
but this is SO GREAT.

This really is pretty cool. The world is a
crazy place, truly.

Example

3. Is there anything else you would like to tell me?

I had an immense sense of relief that
this unit is back to the mathy stuff
and I don't even know who I am anymore

One of us! One of us!

Opening Up Large Classrooms to Relationships

- Made students willing to ask advising problems
- So many more questions were addressed at once through Crowdmark drag and drop functionality
- Students were able to have a one-on-one relationship with me that touched in on a weekly basis
- I got to address common feelings at the start of the class and show that, even though there where things I couldn't do, I still heard them

Failed Experiments

I tried this last year with a regular day time section. I conducted it through UMLearn's survey feature and had one for each unit. Given the chance again, I would likely do the Crowdmark once a week or once a unit.

One-Minute Papers: The Basics

In a one-minute paper exercise, the students are given a prompt question at the end of class that they answer on slips of paper which are returned to the instructor to read after class.

My Ground Rules and Usage

- At the start of class, students pick up a slip from the front.
- With typically 5 minutes (2-10 depending) I put up a prompt question on the overhead.
- Students can answer alone or with discussion from their neighbour.
- Students turn in the slip on the way out.
- I read them after class and give a participation point for a genuine attempt at answering the question.
- **We begin the next class with a discussion of the slips.**

Example of a slip



am confused with the log thing. I thought you always just use the log button on the calculate because when you coded you used the word log. I have always used just the log button in chemistry. I know you can use the ln button but I am unsure what that does. I always assumed log was always the same. Sorry I should have asked for clarification on the assignment.

Use 1: Formulate Practical Interpretations

e.g. Even though there are statistical tools available to fit exponential relationships, why might we want to do a transformation and change it to a linear relationship anyways?

- “Because in exponential your data would be way too big. By doing a transformation you are trying to minimize it.”
- “Possibly to make the language more universal? AKA easier for others to interpret, same idea as standardizing z-scores”
- “Linear models are easier for nonstatisticians to understand as compared to a cubic or logarithmic model. → Linear is considered more or less as ‘basic math’. Likely easier for the statisticians themselves to work with linear models. → Simpler calculations (probably) → Also generally a better understanding”

Use 2: Poll for prior knowledge

e.g. **Have you ever programmed using for or if loops?**

e.g. **What computer programs or programming languages have you used?**

Use 3: Address misunderstandings in tests/assignment

e.g. In your home discipline, if someone said log without specifying the base, what would you default assume they meant? If you are willing to share, why did you get log question wrong on the assignment?

- “I am confused with the log thing. I thought you always just use the log button on the calculator because when you coded you used the word log. I have always just used the log button in chemistry. I know you can use the ln button but I am unsure what that does. I always assumed log was always the same. Sorry, I should have asked for clarification on the assignment.”
- “Chemistry \log_{10} and \ln , Calculus \log_{10} . Chemistry would definitely default to log base 10 this is because pH is all based on a 10 fold increase.”

Use 3: Address misunderstandings in tests/assignment

- “Mainly I have used log base 10. So I just press the log button on my calculator when it says log in an equation, instead of thinking to press ln. I think the default would be log base 10 when nothing is specified and ln would be used for natural log or stated log base e.”
- “In my field of computer science, log is defaulted to base 2 as powers of 2 are used for things like converting to binary and analysis of algorithms. Outside of computer science, I’ve used log in classes like math, stats, chemistry & physics. In those cases, I’m used to seeing ‘log’ as base 10 but ‘ln’ as base e.

Use 4: To Assess Understanding of the Lecture

e.g. State back to me (in your own words) what is a sampling distribution of a statistic.

e.g. When I say that the standard error of the slope ($SE_{\hat{\beta}_1}$) is 5 (for e.g., what is something that this practically tells you about the true slope of the sampling distribution of the slope?

Use 5: To Give Pause For Reflection On Big Ideas

e.g. **What is one thing you took away from today's lecture?**

- “I will take away the fact of always needing to be skeptical about recorded/calculated data & to always ask questions. Previously, I would see a data set and just “assume” it was correct since it was already put together and worked with. There are now so many options to assess & question the #'s & data that some of the biggest decisions are made from.”
- “Outlier & Influential points are different and need to be asked why?? In kinesiology asking the question of why in data makes me want to research. Why is a keto diet effective in certain populations? Why do certain body mechanics lead to higher injury points? Is it because of conflict of interest, a shift in descriptive terms through articles. It’s very interesting!”

Use 5: To Give Pause For Reflection On Big Ideas

- “It’s really important to think critically re:outliers - there might be a reason for their existence that surprises you. It could tell you a big flaw about your design. I work on a research project on Friday so I will keep this in mind. (Really enjoying the class + stories!)”
- “My biggest take away today is that, stats is truly used every day even when you think its not. I am truly shocked they thought those billets [JT: ballot] were a good idea. Opened my eyes on the views of stats.”

Use 6: Brainstorm Finer Points

e.g. **What are some red flags that a statistic you've been given may be misleading?**

e.g. **What are some reasons that real life values don't match up exactly with our predicted model values?**

The Most Important Takeaways

- Always acknowledge the slips, even if you were just taking a survey.
- Make room in your class for time beyond facts and content.
- Be flexible enough that if something important comes out of the slips, you can adjust or “take a class”.
- Praise effort and sharing ideas.
- Share and express thanks for “wrong/bad” ideas and their contribution to learning.

Other Ways to Bring in Dialogue

- First day of class surveys
- Mid-semester evaluations
- Discussion posts
- Scaffolding in projects
- Think-pair-share

My Pitch

As we head into a curriculum change and a more simulation-based/data exploratory approach:

- Decide what is most important and leave space for when something else important comes up
- Aim for understanding with confidence that foundational knowledge means they can pick up extra methods later
- Build in some form of feedback to check what is and isn't working and be open to feedback
- Be prepared that when introducing exploratory based learning, you need the time to get “off pace” if they’re really into something
- Make intentional pedagogical choices and explain them to the students
- It’s not about being liked, it’s about demonstrating your investment so that they invest too

Thanks

Thank you!