How to help your students ask questions that promote understanding and learning

Yale School of Medicine Medical Education Discussion Group

Dan Perlman Brandeis University
In Memory of Donald Cohen
Education is what remains after one has forgotten everything one learned in school.
Guideline, Ground Rule, and Plan

1. **Guideline:** Engage with 80% of your attention – use 20% to observe what’s going on in the room.

2. **Ground Rule:** Raise questions at any time.

3. **Plan:** Help students become outstanding question formulators, exploring two specific methods
“Cough Test”

(actually the Clear-the-throat-test)
The Two Methods

Thoughts and Questions (TQs)
(Just-in-Time-Teaching)
Students really read before class
Send questions and thoughts to teacher before class
Teacher adjusts class as needed

Question Formulation Technique (QFT)
In-class question brainstorming exercise
Many different purposes
“Learning results from what the student does and thinks and only from what the student does and thinks. The teacher can advance learning only by influencing what the student does to learn.”

The late Herbert A. Simon of Carnegie Mellon University, Nobel Laureate in Economics
How CAN we influence what the student does to learn?
How CAN we influence what the student does to learn?

Rewards
Punishments
“Guidance”
and...
The Best Way to Learn Anything
Your Thoughts and Questions (TQs)

_In your deepest, fondest dreams, what kind of impact would you most like to have on your students? That is, ten years from now…._

I would like for them to stay open and fresh, to preserve an aspect of beginner-ish wonder as they come into expertise…

_and_

I’d like for them to recognize the remarkable complexity and glorious strangeness of the host-pathogen relationship…

_and_

…That they value curiosity over (the appearance of) perfection. That they have the confidence and humility to admit when they are uncertain or wrong and the courage to acknowledge their limitations and mistakes.
Your deepest, fondest dreams:

beginner-ish wonder

glorious strangeness of the host-pathogen relationship

value curiosity over perfection... humility to admit when they are wrong... courage to acknowledge limitations and mistakes
TQ

Do you see TQs as a technique for the flipped classroom?
Question Formulation Technique (QFT)

We start with a “Question Focus” that prompts you to ask questions.
Question Formulation Technique (QFT)

Four essential rules for producing your own questions:

1. Ask as many questions as you can.
2. Do not stop to discuss, judge, or answer the questions.
3. Write down every question exactly as it is stated.
4. Change any statement into a question.
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Form groups of 4 with people you do not know.
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Discuss: What might be difficult about following these rules?
TQ

How hard is it to shift from the high value on coming up with the right answer to the benefits of learning to develop good questions?
Our “Question Focus”

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Categorize your questions

Open questions
and
Closed questions
(very short answers)
Improve your questions I

Change Open questions to Closed and vice versa
Now, choose the three questions that most interest your group
Improve your questions II

Really improve them...
The QFT helps students…

*produce* their own questions

*categorize* and *improve* their questions

*prioritize* and *strategize* on how to use their questions

*Many thanks to Dan Rothstein, co-developer of the QFT!*
TQs

Grading/Motivation
What is the relationship between students’ engagement with TQ’s and their grades?

Many educational interventions work best when grade-driven. Are there any ‘grading’ dependencies in these methods, since we’ve no such motivators available?

Assessment
How do I evaluate students’ progress when using this method?

Will this improve their learning and knowledge. if so, how? How do you measure?
THE DISTRIBUTION AND ABUNDANCE OF ANIMALS ORGANISMS

By

H. G. ANDREWARTHA
Waite Agricultural Research Institute, University of Adelaide

and

L. C. BIRCH
Department of Zoology, University of Sydney

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QFT: Start and End of Course

How do you measure species abundance? (start)

vs.

How do you measure a species abundance if it has a naturally varying population size? (end)

What are the typical patterns of abundance? Distribution? (start)

vs.

When measuring distribution, how do we define a species when it gradually changes over space? (end)
Only One Colony per Mature Tree
Multiple Colonies in Young Trees
Why is it beneficial to have more than one queen starting a colony?

- How begins a Cecropia tree?
- Do the queens eventually fight each other?
- Is it better to have a group of the same species queens or different species?
- Where do the males go?
- How is it possible to have more than one colony per tree?
- Is there different levels of competition between different species?
- Are the cells in the tree connected?
- How do they connect the cells to fit the whole colony?
- How does the female detach her wings?
- What do the food bodies contain that makes them able to sustain the ants?
- Are there other competing species on the trees besides these ants?
- How does one track colonies over time?

Does population increase as the tree grows?

- Do colonies in different trees communicate?
- Is population size correlated to tree size?

What is the queens dynamic with each other over time?

Do worker ants work for one queen?
How can I incorporate this into teaching learners on rounds?

How do you direct the QFT to a learning point beyond expanding on what isn’t known…?
Some ways to use the QFT

Pre- and post-assessments
Launch research projects
Explore topics in depth and breadth
Introduce themes
The Question Focus in the QFT

Clean & Simple

*The Distribution and Abundance of Organisms*

Rich

Zoo trip

*Count Every Star* (1950s doo-wop song)

10 minute research talk
I thought over my undergraduate and graduate experience at MIT and realized something… In my technical courses, I had rarely done anything but solve problems. …

I had a fierce battery of problem-solving skills and hardly any problem-finding skills.

David Perkins, *Making Learning Whole: How seven principles of teaching can transform education.*
Your Thoughts and Questions (TQs)

How do we shift focus from problem-solving to problem-finding...?

What are the **administrative supports and roadblocks involved in making the significant (and positive) changes** involved in this kind of pedagogical reform?

Do you have any thoughts about the extent to which this technique impacts equity in a classroom setting?
“Becoming a doctor means becoming someone who can ask the questions, understand at least some of the answers, juggle all the stories, and in some way accommodate the emotion.”

*The Patient Narrative* by Perri Klass
Your Thoughts and Questions (TQs)

How will we consider the long context of medical education in which students are encouraged to memorize and recite when rethinking teaching and learning in medical school?

You report success with undergraduate students. How do you think medical students will respond to this technique?
Dear Dan Thank you for showing us the slides.
I am rele intrusid obt it.
I wod like to bo it to.
Love Rivky
Enjoy your teaching...
Enjoy your teaching...

and your students’ learning!