Pearson

Q&A Report – Questions answered by Marcus Berg

How to keep students engaged when teaching at a distance – A professor's perspective

21st April 2020 – 11:00 – 11:45 AM CEST

Recording: https://www.youtube.com/watch?v=pN9S6a3mZ3g&t=48s

Questions on Peer Instruction

1. Q: Is the correction after discussion because they learned? Or because they blend in with the majority?

A: If there was completely arbitrary "majority rule", there would on the average not be any improvement in a group where in Round 1 (individual answer) there was 50% correct answers. But in practice there is almost always improvement towards the "correct" answer. So, I think your concern is a smaller concern than one might think, at least in physics where there a sufficiently well-defined question can have a "correct" answer that can be reasoned towards.

I wrote "almost always" because there are a few questions where I see an increase of the number of "incorrect" answers, which weakens my argument above. But I can identify those questions with hindsight, and then use them sparingly to highlight widespread misunderstandings.

2. Q: So how do you trigger peer discussion during session?

A: I pose a "trigger" question and use the "30-70 rule" of #Mazur, as I outlined in the webinar around 10:57. The "trigger" question might be #multiplechoice , or not, but I find it works best if it's multiple choice and maybe a little controversial/thought inducing.

The example trigger question I gave in the webinar (about drawing arrow) might be unintelligible to many of you, but at least one general lesson can be drawn: I defined a pretty narrow range of angles to be "correct", more narrow than is actually "correct" in some precise sense. This is a cheap trick to make students that are "borderline correct" have to defend their views, since due to the system labelling them "wrong" (though they haven't been told this yet), it will pit them against students with "mainstream correct" answers. As I said in the webinar, there are a few stubborn ones that are definitely wrong, but they are wrong for a reason well-known to me, so the subsequent discussion can be structured to focus on clearing that up.

3. Q: I asked my students in Stockholm what they think about breakout rooms and it turned out half of them really like it and the other half hate it. Do you have a similar experience and how would you go about this?

A: With all due respect, I think that if you actually asked the students whether they like #breakoutrooms in general, it's like asking if they like lecture halls: the answer depends entirely on what you use them for. In our TA sessions (practice sessions run by a Teaching Assistant, usually a senior student) we have preassigned breakout rooms (create from CSV file), and the students can push the breakout room "ask for help" button. That works OK. In my peer instruction sessions, the breakout rooms are random assigned.

An indication they want to be assigned to a breakout room is that my students can choose to enter Zoom as Guest (in which case they cannot enter breakout rooms), but most of my students don't enter as Guest, even though it saves them one button-click of entering a password. Admittedly it's not a proof they like it, but it's an indication I believe.

As with all discussions, students have to feel they get something out of participating, and with peer instruction à la #Mazur, it's made quantitatively clear to the students that discussion helps, since their answers tend to be "more correct" post-discussion, without teacher input.

4. Q: I teach in a university. Our management is strict about the platform we use, and we should only use our own which is considered "secure". In these data-sensitive days, how can we trust platforms which are available to the general public?

A: I leave that question to our computer support people, that claim that the registered version of Zoom we use is safe enough.

5. Q: Isn't it more time consuming for students?

A: According to my estimates, I don't think so. You're absolutely right that we as teachers do need to worry about claiming too much of students' time: it's easy to fool oneself to thinking that pre-recorded video can "free up time" in general, but this is false: it does "free up" lecture time, but still eats into total study time for the student. However, I find that I am much more efficient on pre-recorded video, so I cover the same material in half the time! (I'm also less funny pre-recorded. 🙂 But I'm not sure how funny the students think my in-class stand-up comedy material is anyway). That is one sense in which the total time spent

for a typical student can be the same with peer-instruction sessions as without, even though they get more discussion time when the teacher uses them.

A perhaps more subtle point: do you know how your students currently spend time they claim they are "studying"? I find that students move more and more towards using online material (e.g. YouTube), that they find themselves or get suggested from more senior students. This is not material I have suggested, so you might not have counted that towards what they "should be studying". But they often do, with some justification, they believe they are in fact studying for your course, just using a format they prefer that they get offered on e.g. YouTube, but perhaps to a lesser extent by you as the official teacher.

But is that so bad? I think most often yes it's bad: much of the freely available material is either just misleading or wrong, but sounds good superficially ("help with your studies!") or decent/good stuff but not suitable for my particular class (even though the words sound similar). So, I can actually save time for the students by offering something in a format (YouTube) that competes head-to-head with the online material they are already using without my consent. It is debatable how one should count study time concerning non-suggested activities, but I think it's fair to count as I advocate here: think of actual time currently spent with actual activities, not your dream scenario of how you would like the students to act. But maybe you are already realistic about this: I know in the recent past I was not.

6. Q: How do you compare the student's entrances? Some of them will tackle conceptual difficult subjects and others not, but they are original.

A: It's very important to evaluate preexisting knowledge. I use the "Force Concept Inventory", a standard entry-level test (in the given link, examples for many subjects are given). The students who do poorly get special assignments in the beginning. This way, some fraction of students who previously rated the class "too difficult" afterwards now write "I was ill prepared". It would be even better if they were well prepared! But that's outside my scope as teacher of a specific course, I have to take the students I get. (It's well within my other job as program manager, but that's a different story!).

To summarize: we all have some fraction of students who are poorly prepared, but if those students **can be helped to realize they are in fact poorly prepared relative to other students** (as opposed to the course being objectively too difficult), it may make them **more susceptible to peer instruction**.

Pearson

7. Q: Do you assign peer groups? Or do you let students form their own? And why?

A: This is very important, but I explained the #Mazur method I use at the beginning of the webinar, so let me refer there: it's around 10:57.

8. Q: I'm a teacher in communication and event management. So, one right answer is not very often the case. How can I use peer instruction?

A: I often hear this about #multiplechoice, that "in my subject there are many correct answers". That's true in physics too! I think maybe you just haven't thought about it enough? Every subject worth teaching (which surely includes yours!) has statements that are true or false to varying degrees. Also, in physics, the teacher needs to do some work to get to a sharp enough question. (In fact, I sometimes ask meta-questions about good strategies to "correctly" define a "correct" question). The good news is: once you arrived at a well-designed question, you can use it year after year! And fortunately, in most subjects taught at most major institutions, someone else has already done some work for you, if you google around a little bit. Maybe someone has a suggestion specifically about this subject.

About multiple choice, I like this short guide. But in #LearningCatalytics, there are many question types, for example you might like the "highlight" question type.

Questions on DIY Practice Exercises/Engaging students

1. Q: Do you have examples from Computer science?

A: I don't know what branch of computer science you teach, but if it involved coding, that seems like the optimal collaborative subject for distance learning. After all, isn't open-source just one gigantic distance learning project? One student could #roleplay BDFL (Wikipedia link for benefit of others, you would know computer lingo!) and the other students could be the community with various roles. Then they could try other roles and give each other feedback what collaboration modes worked when they were BDFL. Again, structure needs to be added by the teacher. This work can be done asynchronously but be moderated, for example, Perusall is used in computer science.

The collaborative roleplaying I'm proposing is of course already done in one way or another in existing computer science "labs", but equally surely the format can always be improved, or more tailor-made to your particular needs. One way to add structure is to first do a Concept Inventory, and one such test in computer science given in a link in one of the earlier answers is by Caceffo for a C course inspired by #Mazur. If you find that the weaker students have problems with let's say pointers on that test, you could handpick stronger

students who got all those questions right and let them take turns to be BDFL. This kind of "selective" peer instruction can be dangerous (it can stigmatize weaker students as being permanently weaker), but when used carefully could be very efficient for you and rewarding for the students, as for example in Scale-Up. Of course I have no idea whether this suits your particular needs, but my point here is that students can be more engaged if you address a need they have already been made aware of.

2. Q: Any ideas how to implement that in languages classes?

A: First the boring (but most useful) advice, for everyone: the specific ideas in your specific field I would hope you can generate yourself, for example if you bring up the general ideas I mentioned with your expert specific-field colleagues. I'm sure they will have opinions! (As I mention in another response about #mutiplechoice, people tend to have knee-jerk negative reactions, that are mostly unfounded in my opinion, but a good conversation starter!)

Here's my attempt to actually suggest something about #language: as I mentioned to Jacques in an email conversation after the webinar (thanks Jacques!) I took a French course in Paris myself, where conversation was initiated by picking highly controversial topics to stir emotions and discussions. At the beginning of each meeting, the teacher would go through the most important errors some of us made in practice in the previous meeting. This also made great use of the (in my opinion universally true) fact that students are most attentive to detail at the beginning of class.

Example topics they used: death penalty, gay marriage, rude behavior (rank 10 examples of rude behavior in order of rudeness -- there was almost zero correlation between our respective ordering!). One student in the class was gay and married, and immediately several other students said he may be in a relationship but by their definition of marriage, he cannot possibly be married! So the conversation quickly became about what "appropriate" language means in a very multicultural setting, which is pretty suitable for a language class in my opinion.

3. Q: Is it possible to use MyLab with this approach?

A: Yes, Mastering Engineering (that I use for assessment) is the physics version of MyLab, so it should work exactly the same as I outlined in the webinar, using algorithmic questions.

4. Q: I teach wine tourism, so what could do the students do at home?

A: I'm not an expert (maybe someone else is), but aren't one-on-one distance meeting in a cross-cultural big group a useful setup? For example, if half the class are French wine-tourism students, and the other half are Swedish nature-tourism students, you could match them up and they can talk one-on-one either on Facetime, in a Zoom meeting they create themselves, or in your Zoom breakout rooms where they can push "Ask for help" and you go in and give suggestions.

5. Q: Does anyone have any suggestions for DIY on electronics and electricity (at master level)? I am stuck here.

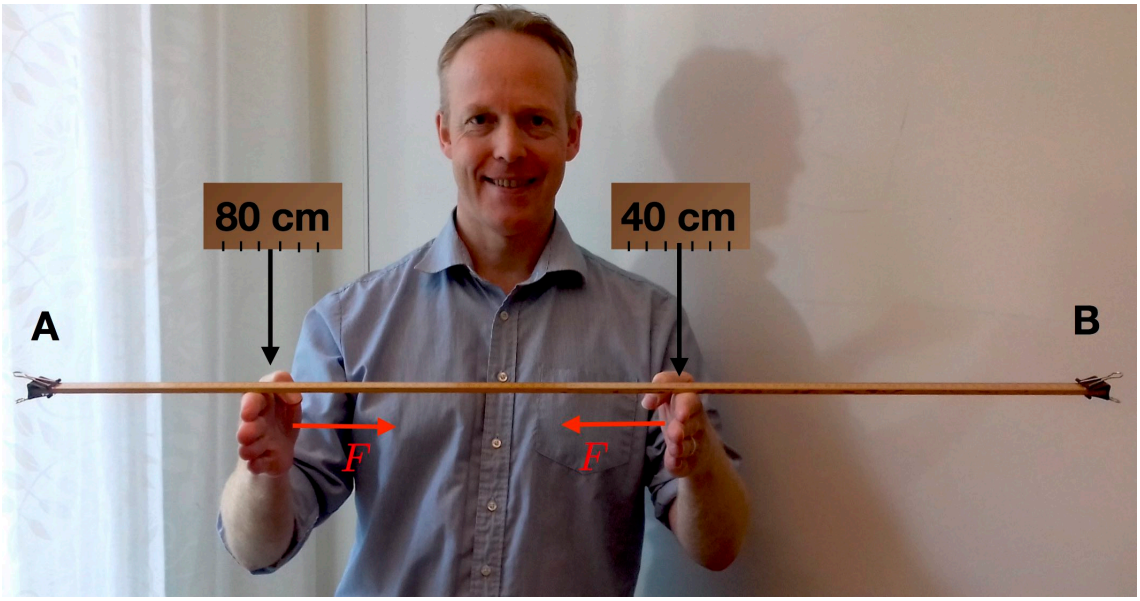
A: Can they order stuff? #Mazur talked about having things shipped. So, you could suggest a list of components they could order and hook up and study. It might be a minor liability for your institution if students start a small fire at home, but then again, that could be a learning experience... 😉

Of course, the Altair 8800 was built as a DIY electronics kit, and that was the beginning of Microsoft... so there seems to be a pretty clear connection from old-school DIY electronics to to modern technology.

And that's not just Bill Gates, physicists like Richard Feynman (quote page) emphasized the importance of tinkering with home radios and the like to become a real physicist. (I guess I'm not a real physicist.)

6. Q: How do you use the DIY in your lessons? Do you show or discuss them in a session with the whole class?

A: It's only asynchronously. As I mentioned in the webinar, I give them a "problem" (or let them select from a list) and they "solve" that using the DIY, in say one week. For example, I show them a picture of me balancing a ruler:



then ask them to get similar equipment and move their hands inwards. Try it and see what happens. Then add a known weight on one side. (It's fun, you'll see why if you try.) Using only the length measurement of where the hands end up, they can calculate the weight of the ruler.

To my surprise, a few of my students actually though the program (Mastering/MyLab) could at a distance calculate the weight of their ruler they found at home! That's of course not possible. Their ruler is only a proxy for my ruler, which they are supposed to answer questions about. Most students get this and found the problem very useful for grasping concepts of friction and torque

7. Q: Teaching Law... Ideas for DIY?

A: Maybe #roleplay over Facetime or in Zoom Breakout Rooms? Surely you already do this in campus setting, where one student is judge and others are attorneys...so try to adapt this to distance? (here I show my ignorance of Law, but I do know that our Law people here use similar systems as I do, since they ask me things about them, e.g. they like the "highlight" question format in Learning Catalytics)

In fact asynchronously might be the best bet for law studies, maybe using Perusall.

8. Q: I would like some ideas of Organizational Behavior practical exercise of somebody?

A: Peers in your subject probably have better ideas, but maybe a meta-discussion? By this I mean you could have them peer instruct some questions -- any questions! -- and analyze their response switching like in this paper? That paper uses Sniezek & Buckley, "Organizational Behavior and Human Decision Processes" (1995).

General Questions

1. Q: Can you somehow estimate how much time/resources you need to spend in rethinking and reorganizing your teaching subject into this kind of approach?

A: I think about it a lot total, but I try to be reasonable how much time I spend every time I teach it. So, for one year I might not make any changes at all, and keep for example my Learning Catalytics questions exactly the same as previous year. Mastering/MyLab is very little work to get started since there are huge question banks predefined to begin from, then I start adding my own questions the next time I teach it when I have a better picture of what is available.

My philosophy is first get some agreement with director of studies or whoever assigns teaching at your institution, that you will keep a class for at least let's say three years, and then you will promise to develop it, and then make small changes every year. Huge changes make things chaotic and impossible to evaluate, in my opinion, so successive changes are much better for me personally.

2. Q: Hi, I would like to ask why some students are more motivated to accomplish their compulsory assignments than express their thoughts orally when it comes to participation?

A: I think most students are pretty pragmatic about what they need to do to get a good grade. So, if expressing their thoughts orally gives no grade improvement, why do it? That's why I try to structure for example my peer instruction sessions, so students see clear benefit for the actual assessment. In my case this means for the final exam. So, an obvious way to do it (and there are many more subtle versions, but this is the big one) pick a final exam question from a previous year and have them answer that to spark the peer instruction.

And as I mentioned in the webinar, if you can boil that "spark question" down to multiple choice, that's the most time-efficient, because it raises the stakes.

(It's a common misunderstanding that multiple choice can only test low-level understanding in various taxonomies. Multiple choice can actually be as open-ended as you like, e.g. all answers could be "correct", but you can prefer one interpretation based on some point

you're making about the current topic of discussion, in effect in most subjects the teacher is in fact trying to steer or moderate the student group in some direction.)

And if you get in the magic 30/70% bracket I mentioned in the webinar, there is a lot of incentive for students to argue their case, and some will so do publicly. More importantly, most will do it in small groups with other students, whether or not they have the courage to do it in front of the whole group.

Shared Ideas and Suggestions

1. "I teach banking and management - maybe DIY could be role playing with family members and discussions on their personal bank account statements".

I'm an avid #roleplay -er so I wholeheartedly support this suggestion! I don't know anything about banking though, but surely someone else does.

2. "In social sciences classes we make use of in depended group work a lot, and then the students present "a practical" - which is selected topic, instead of the instructors talking about it. Of course, they first get instructions and background/basic theories of what the 'practicals' are supposed to be. Some groups are doing better, others – less".

This is exactly how I think about it, there needs to be some structuring. "Practical" is not clear a priori. In fact some people might have reacted to my juxtaposition of "practical" and "conceptual" as opposed to "abstract", in the webinar. By "conceptual" I'm referring to "conceptual labs" in the sense of Wieman & Holmes.

3. "I teach social skills. We make video's in which we show how to engage with patients, for instance in a Motivational Interviewing way. After that we give students assignments in which they (in a breakout-room) practice specific skills. I think they could do this at home as well, with family members or friends (via Facetime or Zoom). Afterwards we discuss".

I mentioned this in the webinar, I think it sounds great. I think Gerdien's point about Facetime is also important: for asynchronous work, they shouldn't be too stuck to whatever distance-learning tool you use, like Zoom. One could perhaps argue the opposite: after seeing you in Zoom they might feel relieved to get to some platform they feel more comfortable with, like Facetime.

The gaming communication platform that starts with a "D" that I was trying to think of the name of is Discord, as several people pointed out. If someone has used Discord for teaching, let me know here how it compares to e.g. Zoom. Incidentally, Mazur said in his webinar about Perusall (go ahead and sign up to see it live, the current week is the last week it's offered!) that they successfully used Perusall in computer science coding classes.

4. ”Move all theory teaching to before the interaction with the class, keep track via metrics of your teaching systems/software of how many watched, then do the discussions and exercises”.

I definitely agree with Silvia's basic premise, but as I mentioned in the webinar, personally I do not move all the theory to pre-recorded (i.e. I don't do a "complete flip"). One "secret" reason is that although I have good pre-watching quotas (around 80-90% watch my pre-recorded material beforehand when I tell them to) I don't want to completely lose the ones who failed to pre-watch. In fact, I also have metrics of when they turned off my pre-video, i.e. those 80-90% don't all finish watching. (The actual number that completely finish is strongly dependent on how long it is, but more like 60-70%%.)

Another reason is that a live person can start your thinking in different ways than someone on a little screen. I have a third metric of watching pre-recordings, which is I use Hapyak to have the video stop and ask a question, and then you see that some of my students definitely doing something else while they are "watching" my videos. That's another reason I don't move all the theory, then I risk the discussion being un-grounded.

5. ”As answer to the 'how can you create a DIY practice exercise": my field is business administration. We have a tzatziki-experiment, were students have to create tzatziki, either with all materials and full recipe and free division of labour, or they have a strict division of labour, practical recipes, incomplete materials. You can thus experience how a division of labour affects things like productivity (how much tzatziki is made in a given time) or quality (is the tzatziki really tzatziki)”.

A: I brought up Liesbeth's suggestion in the webinar. I think "experience" is the key word here. It's one thing reading about it or writing about it, it's another thing altogether doing it.

6. ”Basic chemistry and microbiology exercises can be done with help of food, food ingredients that can be found in the kitchen”.

When I cook I'm always amazed at the amount of chemistry involved. I learned from my father-in-law (who is a biologist) that biology is also key in cooking. Which I guess makes sense if you use living things, be it plants or animals. For example, a turkey cooks faster if you brine it, since salt deteriorates the cell walls. It's hard to check in the kitchen that that is truly the reason, but it sounds reasonable to me. So, I guess this could be a microbiology lab?

7. "I teach statistics in university, and in our applied statistics course (2nd course) we have a design of experiment project - where the students in groups have to design, perform and analyses an experiment. Many of these are extremely impressive, and some of these can be done at home. For example - factors that influence the time for water to boil (size of pan, adding salt). They get a good understanding of uncertainty and how that influences the data analysis. Here is an old page from course (I don't give the course now): https://wiki.math.ntnu.no/tma4267/2016v/doe".

I brought up Mette's beautiful suggestion #boilwater in the webinar, and I think this really illustrates the DIY point: what are we trying to do? I think most complex questions can be broken down into simpler tasks, and then they can be analyzed at home, like with boiling water.

Another topic on Mette's list is "Treatment of welding to avoid fatigue". That sounds harder to do at home! But just by showing that you could analyze that by the same statistical methods as you could boiling water, the teacher clarifies to the student why the "practical exericse" gives real-world knowledge, even though it seems limited in scope.

I think we teachers often over-emphasize the complexity of complex tasks. In physics, the goal is always to reduce to the simplest possible, but no simpler. Einstein said: make the irreducible basic elements as simple and as few as possible without having to surrender the adequate representation of a single datum of experience. [link].

8. "Motivation in more applied studies: I usually start with the application and work my way back towards the principles. With students less interested in application you can start with the fundamentals and gradually increase the complexity".

This is a great point. Since I have both groups in the same class (more applied, less applied) I try to do both in my first few lectures: tell the more "applied" ones why they should care, tell the "fundamentalists" (like myself) why they should care, and tell them why they should

use each other to learn. In fact, my class is the last in their respective programs they will see each other, after my class it gets more specialized, so I make a point of that.

9. "Suggestion for Marketing: let them make a commercial in which they learn to apply a sales theory".

This clearly sounds like a great idea.

10. "How are you presenting/recording your writing while we are talking? That would be useful!"

A: If the question is what device, I use a Hovercam.

Resources

from the emails I got, the following direct links were also of interest if you want to put some of them in some resource document (or you could leave it to me to send to interested people):

YouTube channel Marcus Berg https://urldefense.proofpoint.com/v2/url?u=https-3A__www.youtube.com_user_marcusbergmovie&d=DwIGaQ&c=0YLnzTkWOdJlub_y7qAx8Q&r=LeRqAkkB-RSq_PXDte5vbmeVVyFZl16jgg2V6k62tL0&m=iJWOWFrHBryrfzttZ77Jbf2oJ-2w132bk7yAl2Ma9Lk&s=V_mj6f4m4yEURjTzZ3_gAXO1clGykiIraa0B-3hzm_8&e=
Marcus Berg DIY video (Swedish): https://urldefense.proofpoint.com/v2/url?u=https-3A__www.youtube.com_watch-3Fv-3DJAv-2DxYg6SwA&d=DwIGaQ&c=0YLnzTkWOdJlub_y7qAx8Q&r=LeRqAkkB-RSq_PXDte5vbmeVVyFZl16jgg2V6k62tL0&m=iJWOWFrHBryrfzttZ77Jbf2oJ-2w132bk7yAl2Ma9Lk&s=syl8NjTxYYOg_7uzVM3UsVeqFLfZbFC8k1uGwwTLf6U&e=

Marcus Berg "Practical Exercise" didactics
paper: https://urldefense.proofpoint.com/v2/url?u=http-3A__kau.diva-2Dportal.org_smash_record.jsf-3Fpid-3Ddiva2-3A1381046&d=DwIGaQ&c=0YLnzTkWOdJlub_y7qAx8Q&r=LeRqAkkB-RSq_PXDte5vbmeVVyFZl16jgg2V6k62tL0&m=iJWOWFrHBryrfzttZ77Jbf2oJ-2w132bk7yAl2Ma9Lk&s=lcy41PtYVOZTnc5xzgQPbZZeq2MihoiWOfx89VrQ98g&e=
It's a short version, we hope to write something more extensive in the future.

Eric Mazur, for example here on Learning Catalytics
https://urldefense.proofpoint.com/v2/url?u=https-3A__www.youtube.com_watch-3Fv-

3DSQzYPQp9EDc&d=DwIGaQ&c=0YLnzTkWOdJlub_y7qAx8Q&r=LeRqAkkB-RSq_PXDte5vbmeVVyFZl16jgg2V6k62tL0&m=iJWOWFrHBryrfzttZ77Jbf2oJ-2w132bk7yAl2Ma9Lk&s=aeg8PwHFra9Wg8OMr3a59Lq-8gnoXQkvL0UCoWFxkwo&e=

Eric Mazur webinars
https://urldefense.proofpoint.com/v2/url?u=https-3A__calendly.com_ericmazur_fliponline-3Fmonth-3D2020-2D04&d=DwIGaQ&c=0YLnzTkWOdJlub_y7qAx8Q&r=LeRqAkkB-RSq_PXDte5vbmeVVyFZl16jgg2V6k62tL0&m=iJWOWFrHBryrfzttZ77Jbf2oJ-2w132bk7yAl2Ma9Lk&s=GnYZ_q0hs_88SLvocuFR09XTFm9h6mOV6hFb9-z15u8&e=