

Experiences with flipped classroom

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How to get better teaching with less work!

- Less > 0
- After an initial investment

Better teaching

Requirement for learning

- Think about/work with the material
- Correct misunderstandings

This is not always what happens in our lectures

Flipped classroom (my version):

- Students watch video lectures before class
- Class spent on discussing the material

I knew this for a long time, but seemed challenging to change....

And then came corona

Spring 2020: Fu**, we have to teach online. What do **we** do?

Lectures: Not much is lost by watching a video recording

Pro:

- Can watch when you want
- Can go back, watch again, pause...

Con:

- Cannot ask questions
- "I will watch it tomorrow, or the day after or....."

Let's do
something
about this



Eva Maria Gonzalez Ruiz

Format

Upload videos with lectures + questions

Class:

30 minutes group discussion of questions

15 minutes discussion together

15 minutes break and repeat

Goal

- Discuss the material with fellow students/me
- Ensure that they understand it
- They need to watch the videos in advance to participate



Eva Maria Gonzalez Ruiz

Examples of questions

Questions about Bell inequalities

First half (mainly part 1 of the video)

1. How fast does the collapse of the wave function happen, and why is this a concern for relativity?
2. What is local realism?
3. How would Einstein, Podolsky, and Rosen explain the correlations in the singlet state $|\Psi^-\rangle$?
4. What is Bell's inequality, and why does it look the way it does?
5. How do we make an experiment, which violates Bell's inequality?
6. What do we learn from an experiment showing a violation of Bell's inequality?
7. Suppose that an experiment show no violation of Bell's inequality. What does this teach us?
8.

What did I say first?

What did I say then?

And after that?

Here you need to think a bit

Outcome

Data points

B4 2020: Quantum Information (4th year)
~30 students via Zoom

B3 2021: Quantum mechanics 2 (2nd year)
~100 students via Zoom

B4 2021: Quantum Information (4th year)
~30 students via Zoom

B1 2021: Quantum Information (4th year)
~25 students IN PERSON

Student evaluation

Very positive

“I really liked the pre recorded lecture system, followed by class discussion.”

Mainly positive

Very positive

“10/10 would recommend.”

Very positive

“The alternate lecture-videos-and-discussion structure was excellent!”

Quantum mechanics 2

Made poll: voted to keep format as opposed to live lectures

But: at low point only ~20-30/100 people attended discussion

Student comments generally positive, but:

- It takes more time
- Complains about random group assignment

My Comments

- Understanding takes time
- If short on time: just watch the videos and it is the same as standard lectures.
- Can watch videos at 2 or 3 times speed.

Numbers of participants may matter

Grumpy old professor's conclusion:
maybe 4th year students are more mature?

Conclusion

I think it works better. Students generally positive

My job easier: recycle video (~90%). Main task: talk to students (FUN!)

Big test: Block 4. 100 students, in person.

Groups as they sit in auditorium

Unsolved challenges:

Some students sit in groups and don't participate much

Format for final discussion not optimised. Attempts:

- 1) Vote on which questions to discuss. Works ok, but some stuff not covered
- 2) Student writes answer in Google form. Good for feedback, but lot of time spent on reading