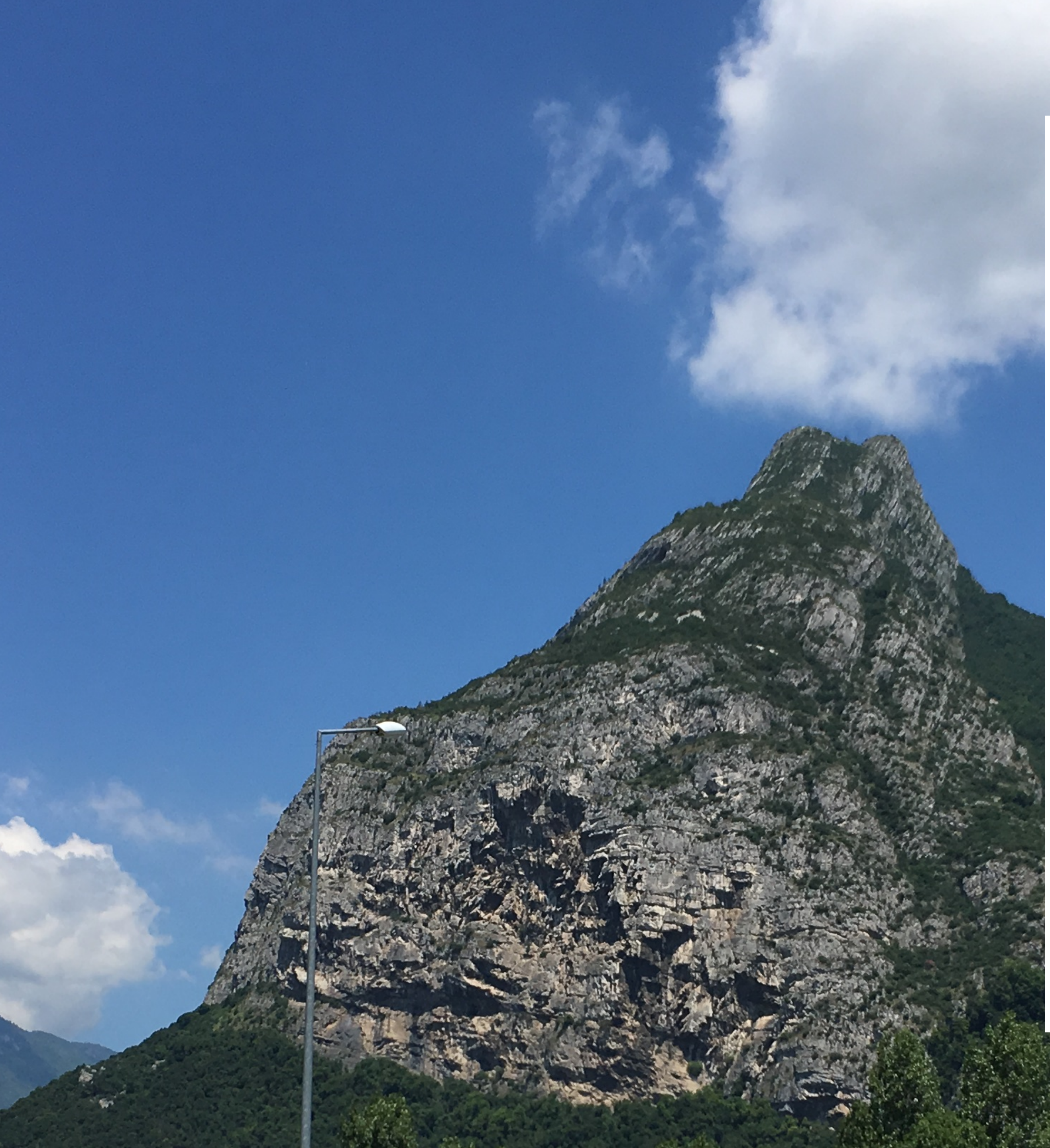

Lesson studies, course design, and preparing for interim period

PANOSC Training of Teachers Workshop Day 3

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Today's agenda

9:00 – 10:15
Presentations and feedback.

10:15 – 10:30
Break – step away from the computer

10:30 – 11:15
Lesson studies I: Helping a colleague

11:15 – 11:30
Break – step away from the computer

11:30 – 12:00
Lesson studies II: Designing own lesson study

12:00 – 13:00
Lunch

13:00 – 14:00
Course design principles

14:00 – 16:00
Work with designing own course in Gather

16:00 – 16:30
Planning for interim period

16:30-17:00
Workshop Wrap-Up on Zoom

Presentations in FB groups

- A person presents a lesson (for about 10 minutes)
- The other persons in the FB group provide constructive, caring, and clear feedback (10 minutes).
- Some possible points of interest:
  - What are the goals for the lesson? Is it clear what students/participants should learn?
  - How does the lesson align with the Theory of Didactical Situations (TDS) model?
- You have about 20 minutes per person + a small time buffer.
- http://bit.ly/fbInstructionsDay3

We will meet here at 10:15

A colleague asks for help

”Yesterday, I was teaching my students about reciprocal space and it seemed to go fine. But when I asked them to solve a simple problem, they couldn’t. I tried to explain and explain, but nothing helped. I fear that the future of solid-state material science is doomed!”

What would you do now to help your colleague with the teaching problem?

What are the questions you need answers to in order to begin helping?

Post in chat or say out loud

Lesson studies

After this session, you should be able to

- Identify key features in a lesson study
- Begin to plan a lesson study that *could* be part of your interim period

Your colleague returns

"I have found this paper, where they have developed some Python [Jupyter] material. Here is what they write: 'Students will [..] apply their knowledge in a Python program that [] quickly carries out the conversions [of real space vectors to reciprocal space vectors]. In addition, an IPython notebook is included so that instructors can seamlessly integrate the topic in their materials science or physical chemistry courses. This notebook simultaneously implements components of the theory and code, providing an efficient means of presenting the topic while also working on examples in class. Students will gain an enhanced appreciation for the reciprocal space topic from seeing the mathematical details implemented in the Python computer code.' "

But I am unsure that it will work or that I will do it in the right way. I heard about some colleagues who observed each others' teaching, and it really helped students understand things better. But how can we go about that?"

As a group, you decide to help your colleague!

What would your steps be if you were to observe your colleagues teaching?

https://ucph.padlet.org/jbruun/stepsObservation (A new kind of padlet)

Text adapted from Srnec , Upadhyay, & Madura (2016)

Som key points from the literature

- Goal setting: A specific problem in teaching that needs to be solved (or a driving question)
- Lesson planning: Some kind of plan for solving the problem (or answering the question)
- Research lesson: A teaching session where the teacher teaches students and obervers observe particular things
- Post lesson meeting: A meeting afterwards where teacher and observers
  - Discuss what was observed
  - Interpret observations
  - Discuss what to change and what to keep in the lesson
- Reflection: Consolidate by writing down what was learned.

Fuiji (2018)

Begin the design of your own lesson study

- For the last person (move up of necessary) in the working group: Find a problem that would be suitable for a lesson study.
- Use the template to start planning your lesson study (http://bit.ly/templateLessonStudy)
- Keep it simple

Break for 15 minutes
Step away from computer
Avoid temptation to answer mail!

Course design principles

First! Over to Peter

Course design principles

After this session, you should be able to

- Analyze how the NS intro course aligns with at least one of the principles, which were used to design a blended university course.
- Suggest how to increase alignment with principles

When planning course

- Argue for and against including different course design elements and principles in your own course

Course design principles (MatN 2016)*

1. Start concrete and gradually make it more abstract. Things you can touch on are very concrete, force diagrams are more abstract and formulas are the most abstract.

2. Let students work with many different forms of representation (graphs, code, images, formulae, etc.)

3. Provide or facilitate feedback on student products

4. Let students work individually when they need to build up knowledge they will use on their own

5. Let students work in groups when they can help each other to construct the necessary knowledge

6. Make room for the students to make relevant connections between what they learn in the course and what they can encounter later.

7. Make room for productive failures – mistakes that students can learn from.

8. Make sure that the students actively develop a conceptual understanding of mechanics.

9. Make sure that there is a connection between intentions for the course (learning objectives), teaching activities and evaluation (exam and assignments).

* Won the Niels Bohr Teaching Prize in 2016

Task in Padlet (~30 min

https://ucph.padlet.org/jbruun/analyseNS

Follow instructions there

Pros and cons for implementing something like this in your blended course?

Week plan for classical mechanics part of course

Monday	Tuesday	Wednesday	Thursday	Friday
STUDENT PREPARATION I Weeklies assignment part I: "Multiple Choice" via LMS "Calculate & Send" via LMS Deadline 10:00	STUDENT PREPARATION II View online lecture about this week's concepts. Read notes about this weeks concepts. Weeklies assignment part II: Answer conceptual questions via LMS Deadline at 17:00, so TA may look through responses	TEACHING II Discusson of conceptual questions "Today's system" handed out - students analyze system in qualitative fashion in terms of force, energy and obser-vables. Presentations and discussions of results in plenary an	STUDENT POST PROCESSING Find a paper, article, news-article, blog, where this weeks concepts were used in a manner relevant to nano-science Make a short presentation of the article on the LMS.	
TEACHING I Hands-on experience with simulations and small experiments Problem solving in simulation/experimental environment Summing up and discussion		TEACHING III Students work to translate "Today's system" to mathe-matics focusing on symbols and using worksheets, online quiz problems, and/or online lectures Presentations Work on a problem-quiz with a system slightly different from Today's system		Weeklies assignment part III: Online quiz problem Deadline 17:00

Begin or continue the design of your course

On Gather – where we will be available for questions/guidance

Template for planning courses available (http://bit.ly/coursePlanTemplate)

Before you leave the workshop, we advise you to make a plan for the interim period (which ends with the next workshop March 23-24)

In the interim period, Viktor and Jesper will be avialable for questions via mail.

Also, we can make a Zoom-session with each Working Group in March (e.g. the week before the workshop), if you take initiative and ”book” us.

But our calendars tend to fill out quickly, so ask today rather than tomorrow.

Break for 15 minutes
Step away from computer
Meet in Gather

What we set out to do! Are we able to do this?

After the workshop, participants will be able to use the pan-learning.org online platform to

- create activities, lessons and courses
- make decisions on how to facilitate student learning in online and blended environments based on science and physics education research
- implement decisions in lesson and course design.

Furthermore, participants will be able to use their experiences with the pan-learning platform to:

- Provide constructive feedback on peers' lesson plans
- Reflect on feedback provided by others and use that feedback to make changes to consider changes to own online and blended lessons.
- Plan and conduct a lesson study with peers.

The grander picture (revisited)

Workshop 1 (Feb 9-11 2021): Preparation

Interim period: Trying out

Workshop 2 (Mar 23-24 2021): Share experiences