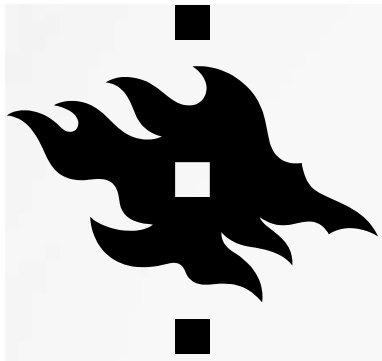




# PROJECT-BASED LEARNING AND COLLABORATION

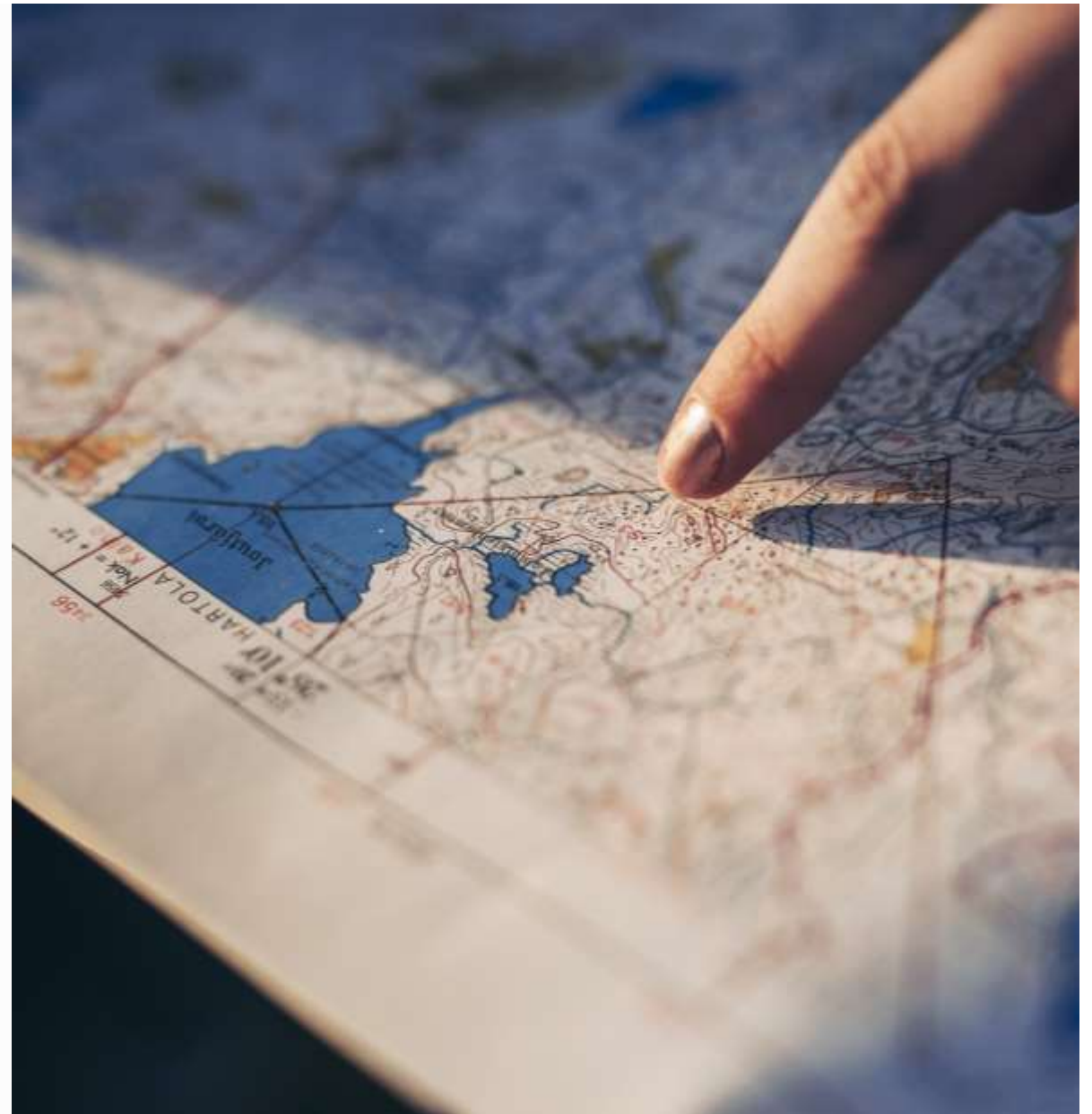
OONA KIVILUOTO  
SCIENCE EDUCATION CENTRE  
LUMA CENTRE FINLAND  
UNIVERSITY OF HELSINKI

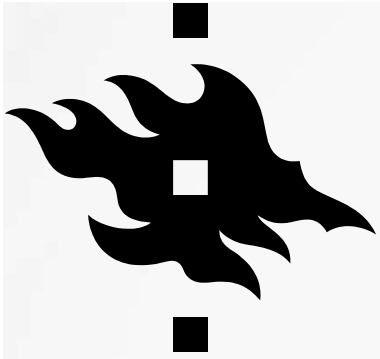




## TOPICS OF MY TALK TODAY

1. LUMA collaboration model
2. LUMA labs as an environment for education and research
3. Examples of teacher training: Study visits and Massive Open Online Courses (MOOC)
4. How to address different themes through Project-Based Learning – Hands-on guide and examples



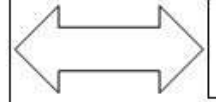


# WE WORK TOGETHER AND SHARE IDEAS

LUMA Centre Finland is an umbrella organization for LUMA Centres in Finnish universities and university campuses.

All LUMA-centres are autonomic.

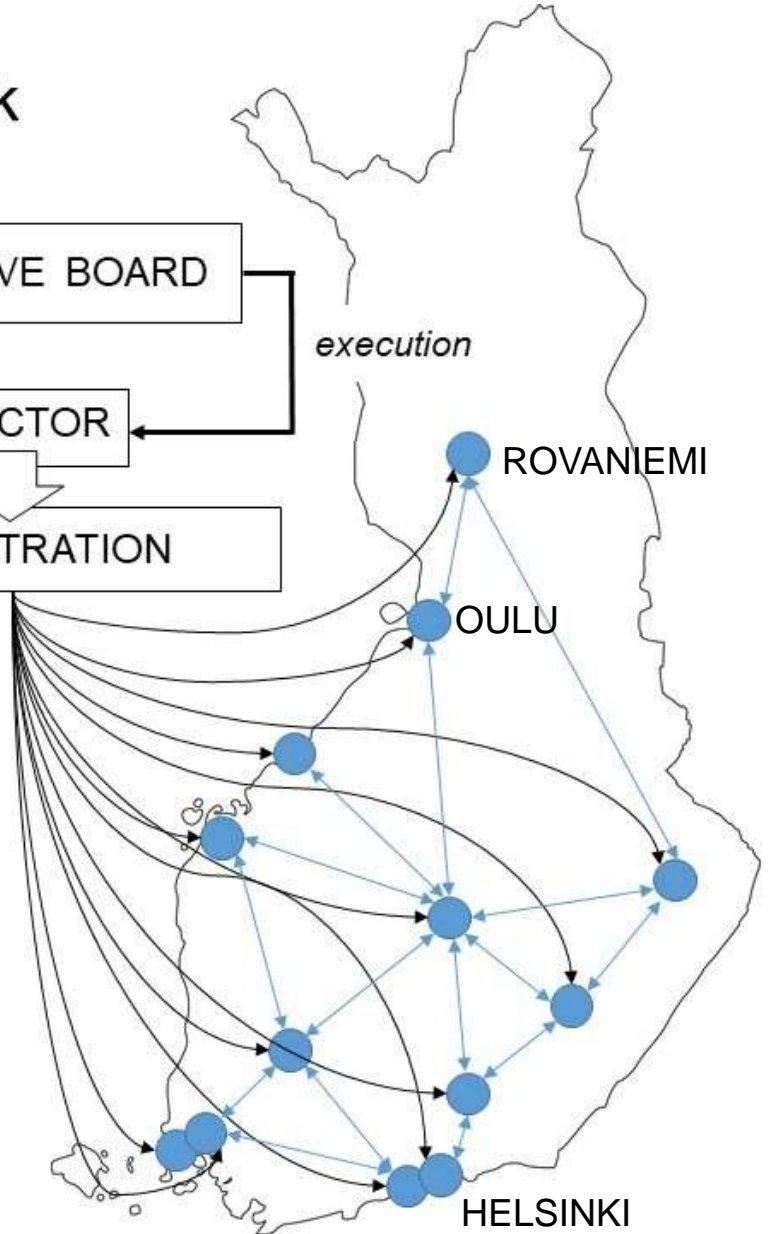
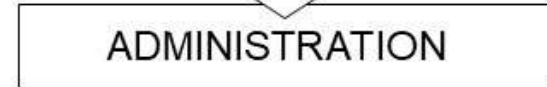
→ We all have different collaboration partners and main focus areas as well as unique know-how.



proposal



execution

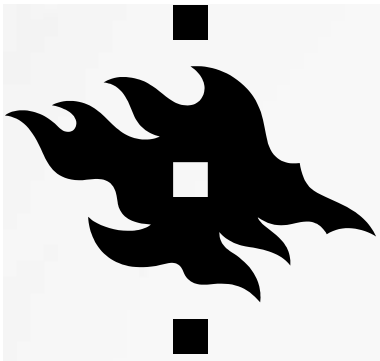


# LUMA COLLABORATION MODEL

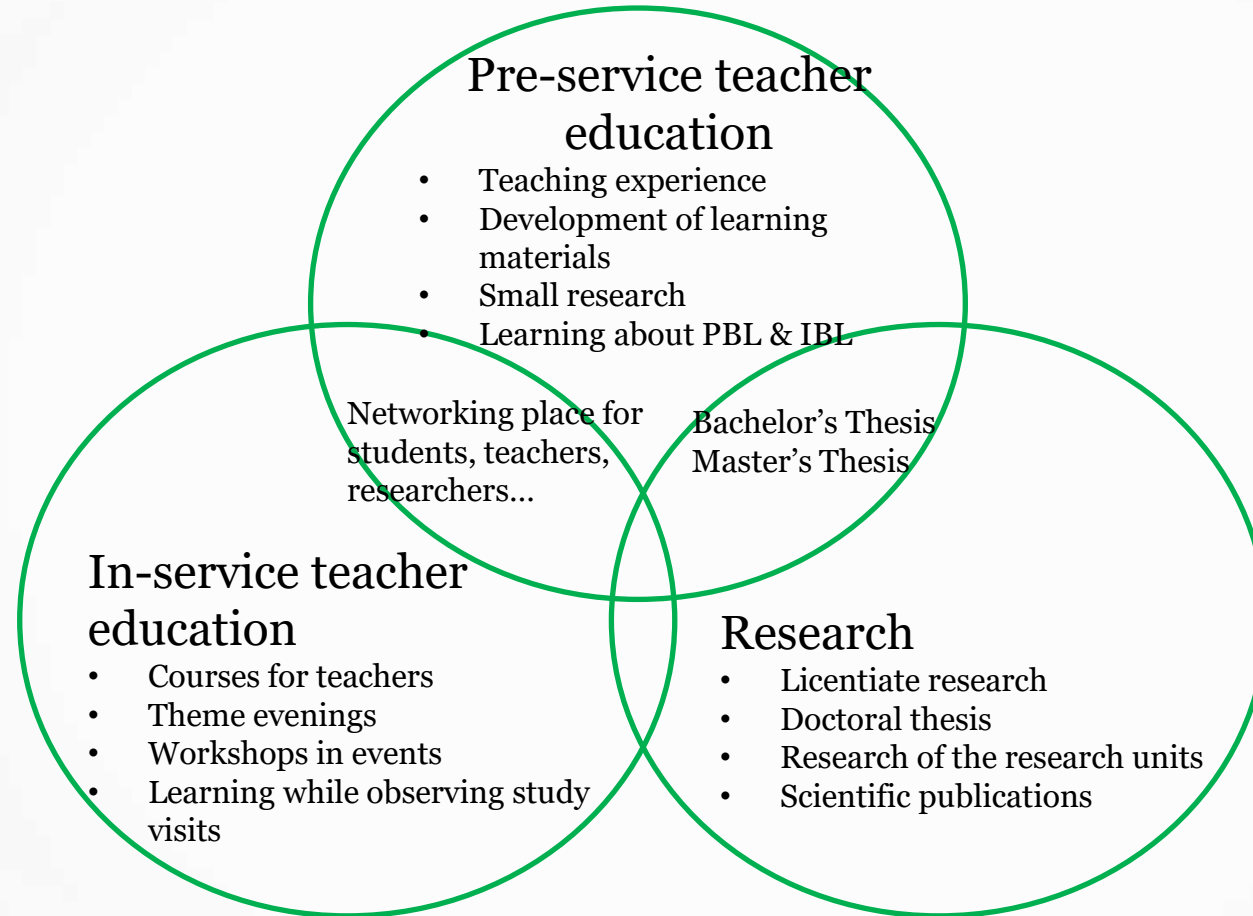
We collaborate with schools, in-service teachers, pre-service teachers, university researchers, families and industry by doing

- Free-of-charge study visits for **schools**
- Science birthday parties with **families**
- Science clubs, summer camps and fairs
- In-service and pre-service **teacher** training
- Projects with **industry**
- Academic research with **University**

As a small country (population about 5,5 million) we trust in collaboration.



# LUMA LABS ACTS AS AN ENVIRONMENT FOR EDUCATION AND RESEARCH



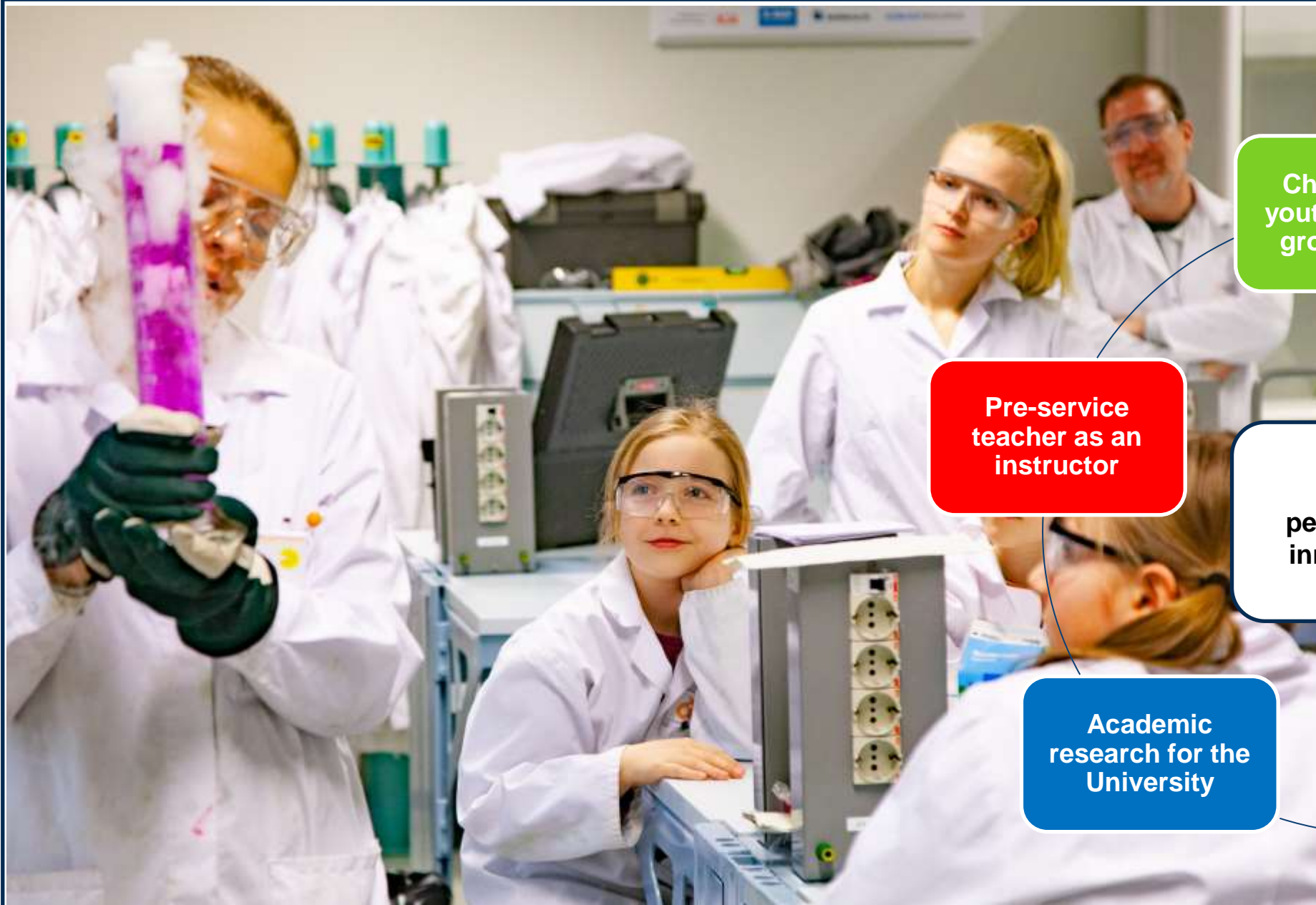
New pedagogical innovations and solutions



Research resources like data and ideas



# STUDY VISITS



Children and youth learn and grow interest

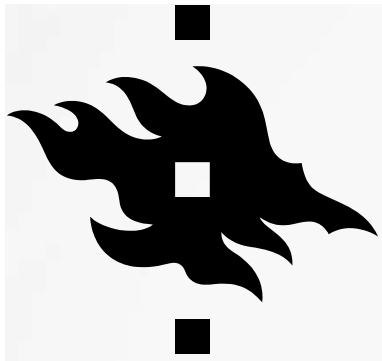
Pre-service teacher as an instructor

New pedagogical innovations

In-service teacher learns new methods

Academic research for the University

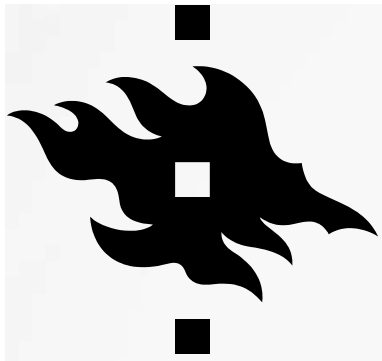
Industry gains attraction



# CONTINUING PROFESSIONAL DEVELOPMENT (CPD)

- In addition to pre-service teacher training and study visits, we have developed Massive Open Online Courses (MOOC) about different topics.
- STEAM topics of the courses vary from math to multidisciplinary climate change themes.



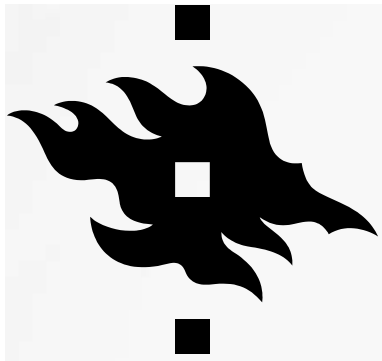


## MOOC EXAMPLES

- Teacher' Climate Change Forum: [MOOC](#) and [Summer Camp 3.-5.8.2021](#)
- StarT-program: [MOOC about PBL](#)
- [How do I create a project-based learning unit](#) -online course





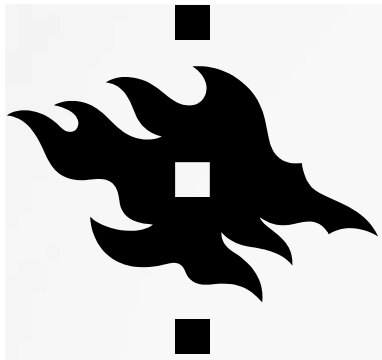


# LET'S TAKE A LOOK AT MULTIDISCIPLINARY PROJECT-BASED LEARNING...

## Goals for today

1. Encourage to try multidisciplinary STEAM themes in your own teaching
2. Give a model how to start planning your own PBL unit





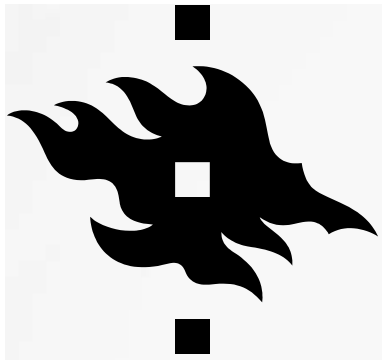
# Exercise 1.

Think of one topic or hobby that you were interested when you were the age of your students.

*Something that you wanted to learn about on your free time.*

For example, for me it was computer gaming: How to built The Sims -buildings that are realistic and look cool?





# Exercise 1.

This kind of passion for learning is what we aim at students to gain:

To offer them something that they are so passionate about that they want to learn it even on their own free time.

→ Having fun while learning

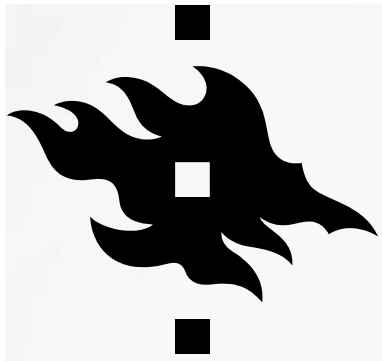
→ Topics of PBL can be anything form computer architecture to sports

Projects can be done in small groups. Everybody can have...

- different topics
- same topic but different projects
- Same topic and project

Topics can be anything: nature near the school, water, computers, what happens in a human body when exercising, how to eat healthily...

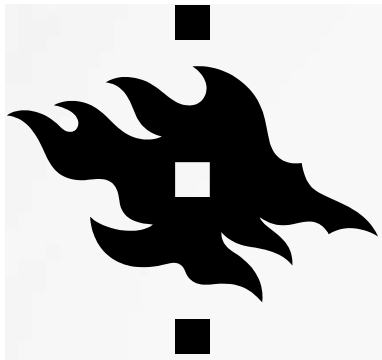
Consider using students' questions as a starting point for PBL.



# PLANNING PBL AROUND STUDENTS' INTERESTS

- What school subjects are involved?
  - Can other teachers in the school join the project?
  - What parts text books and curriculum can we use?
- How to address the topic?
  - Can students plan their own research methods?
  - Do you have supporting ideas to give to them? How would you research or study the topic?



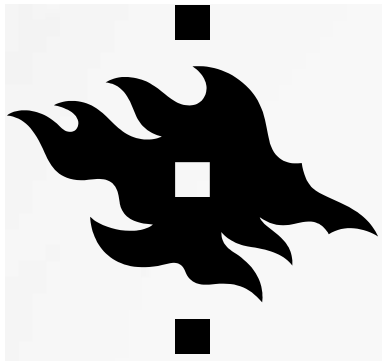


## Exercise 2.

What school subjects are involved in topic or hobby that you were interested when you were the age of your students?

How could you investigate that topic? Could you measure something? Could you solve a problem?



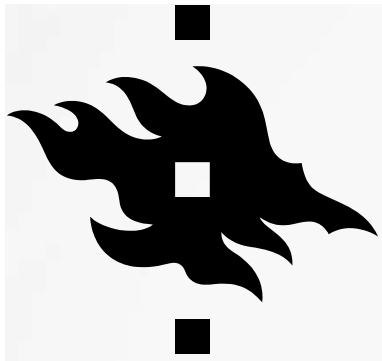


## VIDEO

[https://youtu.be/FJgt\\_aSIoUI](https://youtu.be/FJgt_aSIoUI)

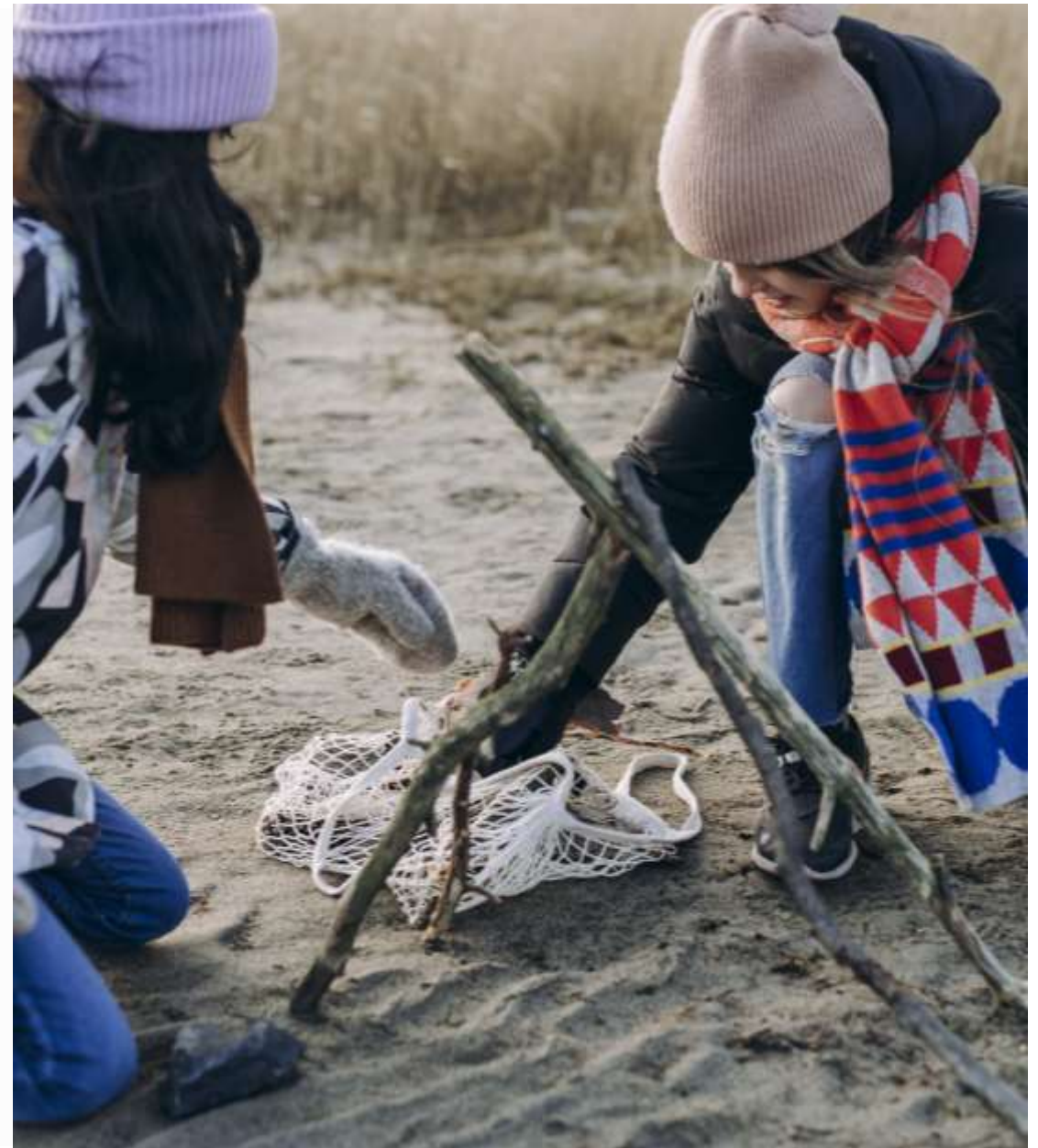


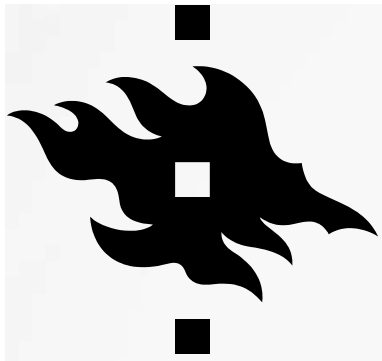
- A group of 13 years old decided to study how to identify forest fires from images taken by satellites or drones.
- This originated from the news of Australia's major forest fires.
- They decided to solve this problem by identifying the fire early, thus minimizing forest damage.
- They decided that the use of satellite images would be the most cost-effective if the existence of a fire could be automatically identified from the images. They decided to use machine learning to identify forest fires.
- They found a very large database that could be used to teach the neural network, but the power required from the machines was too much. They tried to use the free version of the Google Colabs GPU, but the size of the data was a problem. They ended up using a smaller database of images. The database contained images of the forest and forest fires.



# PLANNING PBL AROUND STUDENTS' INTERESTS

- Can we collaborate?
  - Could a local company or university be part of the project?
- How to support students?
  - Can the students themselves act as a teacher for each others? Can they teach to younger students about what they have learned?
  - How to assess PBL?



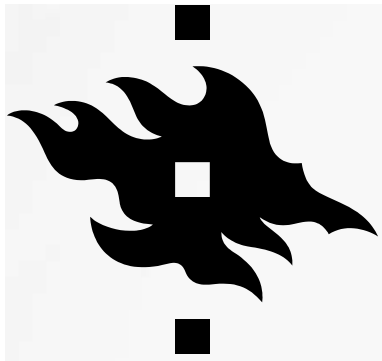


## Exercise 3.

Could a local company, university or spoke person be part of your imaginary project? Can you think of an expert from the field of your interest or a childhood idol on the subject?





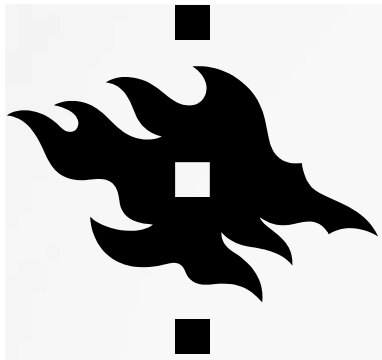


# PLANNING PBL AROUND STUDENTS' INTERESTS

Use formative assessment:

- Peer-assessment where students can vote the best project or give emojis to projects they like. Written feedback can be supported with questions.
- Self-assessment: What did I learn? What was easy for me and what was not? Did I achieve my goals?
- Teacher can evaluate skills: collaboration, communication, presentation, creativity, critical thinking, leadership, flexibility, etc..





## Exercise 4.

Did you achieve your learning goals today?

- Encourage to try multidisciplinary STEAM themes in your own teaching
- Give a model how to start planning your own PBL unit





# LUMAT SCIENCE RESEARCH FORUM

- International LUMAT Research Symposium gathers researchers and doctoral students worldwide to present and discuss about current research in math, science, and technology education
- acknowledges traditional research presentations, as well as new and inspiring methods to collaborate and discuss about research, such as debates
- Save the date for the 11th LUMAT Research symposium on 9-10.6.2021. We also organize a summer school on 8th of June. Both events will be virtual.
- The theme of the LUMAT Research Symposium will be: Engaging learners in math and science through modern technologies. The symposium will concentrate on such teaching, learning and assessment approaches, which utilize modern technologies in math and science education to engage learners of different ages.
- <https://www.luma.fi/en/international-lumat-research-symposium/>

# Thank you!

