

# Problem-based project-organized learning (PBL)

An alternative to give flesh and blood  
to mathematics education

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# Proposal



1. How to understand problem-based, project organized learning?
2. Landscapes of investigation
3. Mathematical mornings
  - ☒ An entry point
  - ☒ Simulating a project
4. Possibilities in the classroom

# PBL: Theory and Method



## Theory:

- Student-centered learning
  - Learning is experiential, it demands an active process that lead to results
  - Define their interest and direction for learning
  - Learning is social and collective
- Teacher as a facilitator
  - Guides students in their process
  - Facilitate theory-practice prelationship

- Centered around a “*problematique*” as a starting point for learning

A problem is a complex situation that allow to pose questions that demand a qualitative change in one’s knowledge in order to address it





## Method:

- Different interpretations and models
- Students work collaboratively in carrying out projects
- Students engage in investigations for addressing the problem that they have defined as being the red thread of their learning process

# PBL in school mathematics education



- Difference between dominant ways of doing teaching/learning
  - Exercise paradigm vs active, investigative approaches
- The source for entering in mathematical activity
  - School mathematics within themselves vs mathematics in operation in the real world

# The mathematical experience

Reference/ Activity	Exercise paradigm	Landscapes of investigation
Pure mathematics	(1)	(2)
Semi-reality	(3)	(4)
Reality	(5)	(6)

O. Skovsmose. Landscapes of investigation. ZDM

# Opening PBL in schools



## Mathematical mornings

(Skånstrøm y Blomhøj)

When you wake up, put on your **mathematical glasses**

Observe your morning with those lenses



# Creating a learning scenario

- Observing daily routines
- Presentation of observations
  - ☒ Time that each activity takes
  - ☒ Water used in brushing teeth
  - ☒ Transportation to school: time, costs
  - ☒ Buildings
  - ☒ Energy consumption and food intake

# Mathematical excavation

## ☒ Posing problems

- ☒ How is a bus fare calculated? What should it depend upon?
- ☒ How to achieve a more efficient service for school students?

## ☒ Mathematize observations

- ☒ Different possibilities depending on students' level
  - “A better public transportation for school children”
    - Arithmetic: Calculating times and prices
    - Mathematical modeling: Transferring systems, planning of shorter routes, environmentally friendly tours.

# Action and formulating solutions to problems

- Solution to formulated problems
  - ☒ Better costs of public transportation for students
  - ☒ Proposals to make transportation safer and environmentally friendly
- Preparing products
  - ☒ Reports, videos, posters
- Acting upon results
  - ☒ Informing parents
  - ☒ Talking to the local authorities
  - ☒ A campaign in the local community

# Mathematical mornings and PBL

- Open scenario
- Student-centered activity and learning
- Inquiry
- Teacher as facilitator
- Generates products
- Interdisciplinarity
- Extension in time
- Process with consequences

# Social political flesh and blood?



- ⌘ Teachers' work is difficult, every new proposal makes it more complicated
- ⌘ PBL offers the possibility of crossing the walls separating schools and the social world
- ⌘ Social and political interactions and actions become an essential part of the mathematics educational enterprise