# Problem-based project-organized learning (PBL)

## An alternative to give flesh and blood to mathematics education

#### Paola Valero

Department of Education, Learning and Philosophy
Alborg University – Denmark

paola@learning.aau.dk

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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



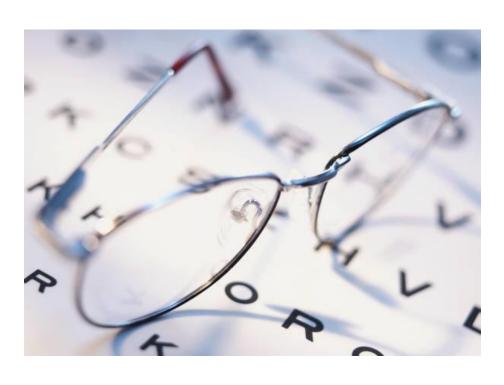
## The mathematical experience

Reference/	Exercise	Landscapes of
Activity	paradigm	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

  - Water used in brushing teeth
  - Transportation to school: time, costs
  - Buildings
  - Energy consumption and food intake



#### Mathematical excavation

#### Posing problems

- 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
- Acting upon results

  - **X**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

