Physics Education Laboratory Lecture 01

Francesco Longo • 06/10/2020

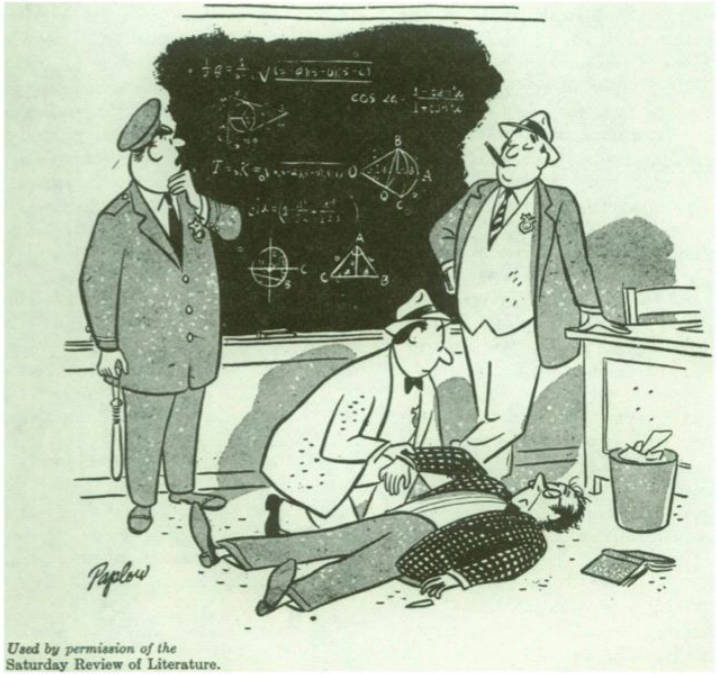
Summary

Course Overview

Course Topics - Lesson Outline

Course Final Exam

Course overview



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Saturday Review of Literature.

"Maybe he knew too much."

Integrated mathematics and physics

MALCOLM SMITH

The Mathematics Teacher , December 1955, Vol. 48, No. 8 (December 1955), pp. 535-537

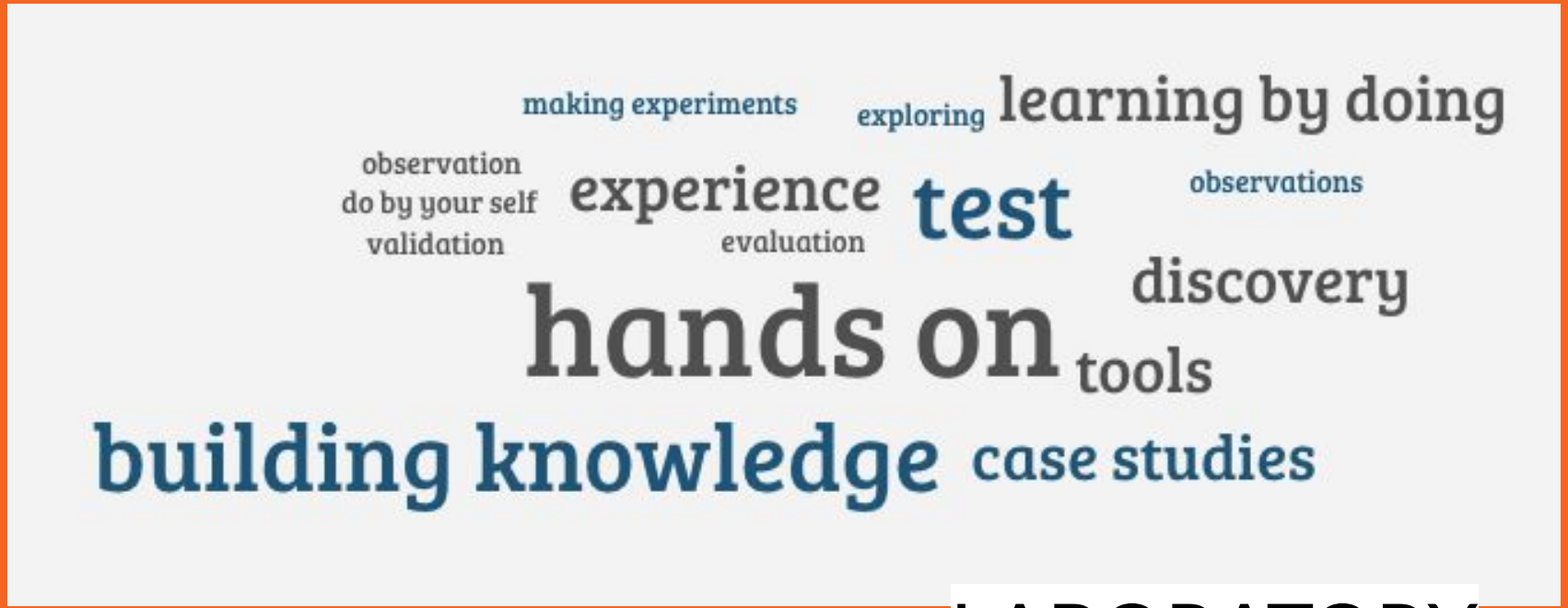
https://www.jstor.org/stable/27955013


maths interplay
predictions
knowledge
induction
reasoning
beauty
modelling
observing nature
laws of nature
understanding
realtà
prediction
predictive laws

PHYSICS


young students
listening
relation
experience
development
skills
observation
attention
art
talking
sharing
life skills
teaching
exploring
care
knowledge
communication
sharing knowledge

EDUCATION


making experiments
exploring
learning by doing
observation
do by your self
validation
experience
evaluation
test
observations
discovery
hands on
tools
building knowledge
case studies

LABORATORY

Course Topics

Teacher's perspectives

- Subject Matter Knowledge (SMK)
- Pedagogical Knowledge (PK)
- Pedagogical Content Knowledge (PCK)

Student's perspectives

- Cognitive skills
- Meta-cognitive skills
- Assessments

Physics perspectives

- Epistemological point of view/development:
  - How Physics works
  - How Physics knowledge is structured

Lesson outline

Observation

- Video - lessons

Discussion

- Teacher's perspective
- Student's perspective
- Discipline's perspective

Conceptual Frame

- Content's details
- Main conceptual difficulties

Teaching Approach

- Methodologies

Laboratory

- Educational experiments
- Case studies

Content Details
Teaching Approach

Main topics

Kinematics

Inquiry Based Science Education

Dynamics

Historical approaches (forces)
Problem-solving; Jeopardy problems (work/energy)

Fluidodynamics

Physics of everyday Thinking

Calorimeter/thermodynamics

Book references (i.e. Il Luna Park della Fisica)

Light Waves

Simulation for Educational Physics

Electrostatics

ISLE - Investigative Science Learning Environmer

Magnetism

Hands-on experiment

Electromagnetism

Multiple Representations in Physics

Quantum Mechanics

Quantum Lab

Special relativity

On line educational tool-kit

Course Final Exam

1. Choose a subject
2. Choose a teaching approach
3. Create your own educational case
4. Present it to an ideal class

Observing physics teaching videos

https://www.youtube.com/watch?v=kxHdVw-mh24