
Physics Education Laboratory Lecture 01

Francesco Longo • 04/10/2021

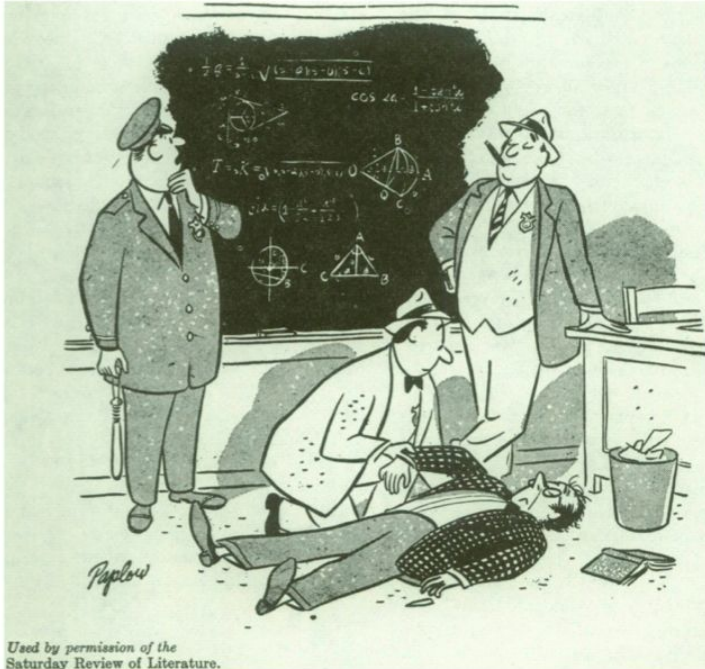
Summary

Course Overview

Course Topics - Lesson Outline

Course Final Exam

Course overview



"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>

<https://answer garden.ch/2127450>

<https://answer garden.ch/2127451>

<https://answer garden.ch/2127453>

Course Topics

Teacher's perspectives

- Subject Matter Knowledge (SMK) or Content Knowledge (CK)
- Pedagogical Knowledge (PK)
- Pedagogical Content Knowledge (PCK)
- Content Knowledge for Teaching (CKT)

Student's perspectives

- How students learn
 - Cognitive skills
 - Meta-cognitive skills
 - Assessments

Physics perspectives

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

Laboratory

- Educational experiments
 - Case studies
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Content Details

Teaching Approach

Main topics

Kinematics

Dynamics

Fluidodynamics

Calorimeter/thermodynamics

Light Waves

Electrostatic

Magnetism

Electromagnetism

Quantum Mechanics

Special relativity

Useful education tools in PER

Early Physics

Multiple Representations in Physics

Historical approaches

Problem-solving; Jeopardy problems

Physics of everyday Thinking

Project Based Education

Modelling instruction

Simulation for Educational Physics

ISLE - [Investigative Science Learning Environment](#)

IBSE - Inquiry Based Science Education

Bayesian updating method

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
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Observing teaching videos

<https://www.youtube.com/playlist?list=PLAA7AA6B0E433653C> PSSC - Physical Science Study Committee

<https://www.youtube.com/watch?v=CDEDDBXuwYvo>

<https://www.youtube.com/watch?v=AsNxXS3kYho>

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

<https://www.youtube.com/watch?v=282D-YkMxyl>

[https://forms.gle/gZScHx
XPw15tcZ6dA](https://forms.gle/gZScHxXPw15tcZ6dA)
