CS-411 : Digital Education

# Chapter 1:

# Introduction to digital education

EPFL

Pierre Dillenbourg, Chris Petrie, Zhenyu Cai, Dominik Gandorf


Digital education
MED21124 CS-411 Cours
Digital education
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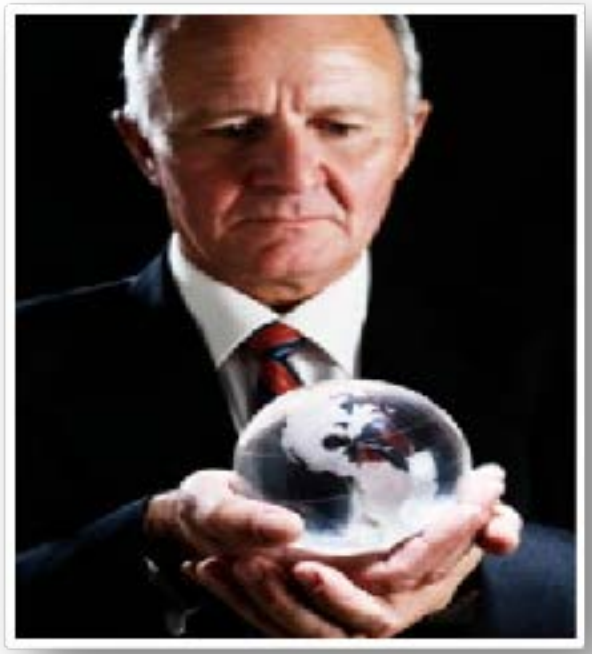
Digital education
INF119 CS-411 Projet
Digital education
INF119 CS-411 Projet



what learners learn
does not depend on right specific technology
but on the cognitive activity they do
(with this technology)

Drill & Practice

Online education platforms

Learning Management System

Classroom participation systems

Simulations

Microworlds

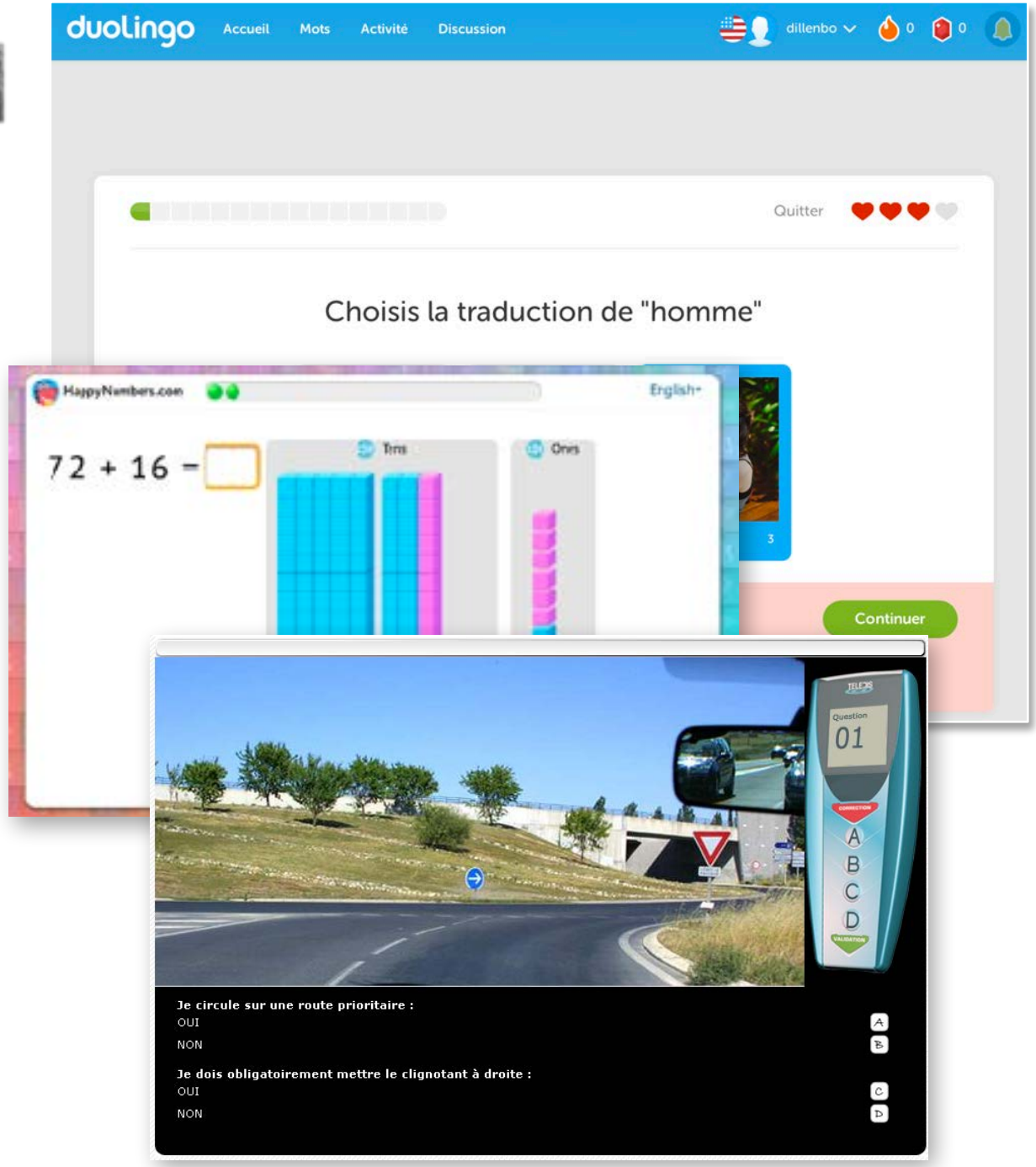
Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics



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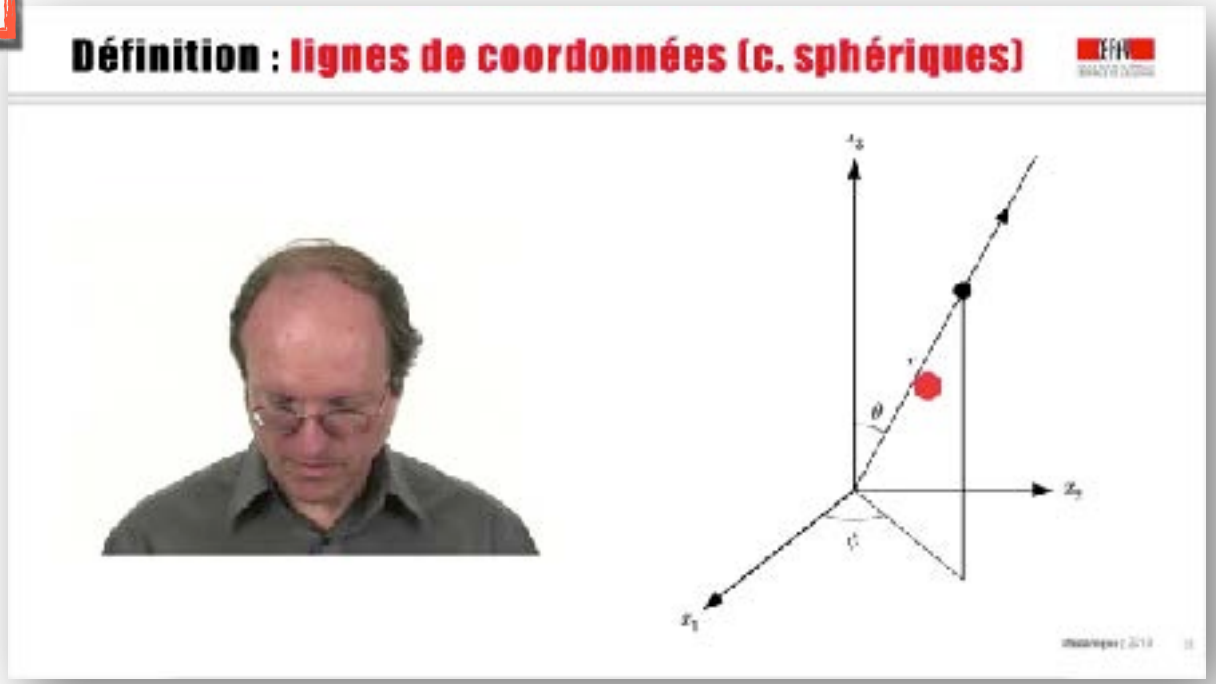


EdX
Coursera

https://www.epfl.ch/education/continuing-education/moocscatalogue/

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Professor Anna Fontcuberta i Morral (EPFL)

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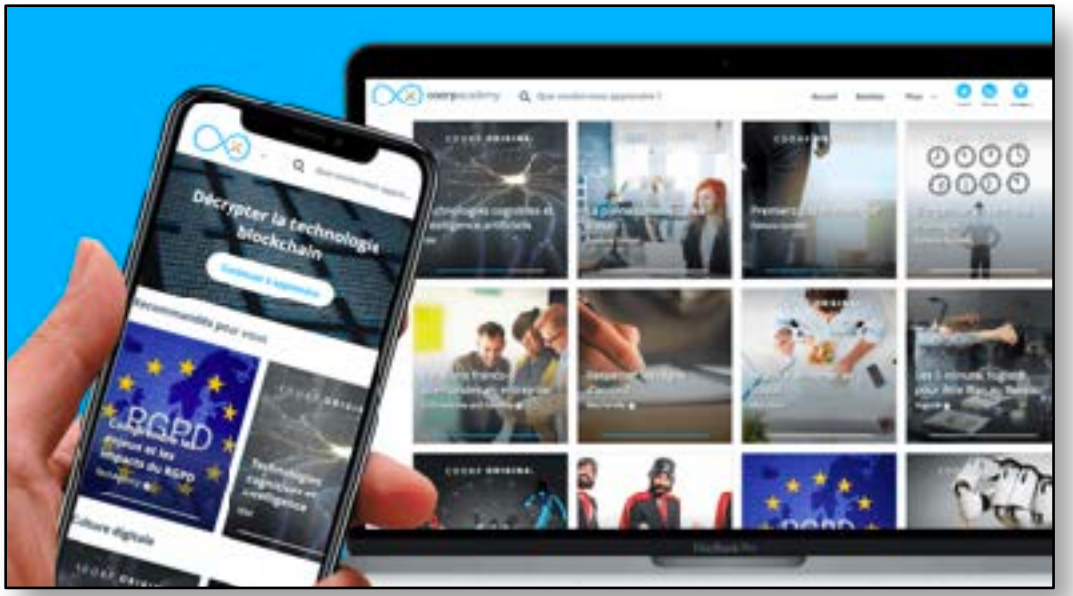
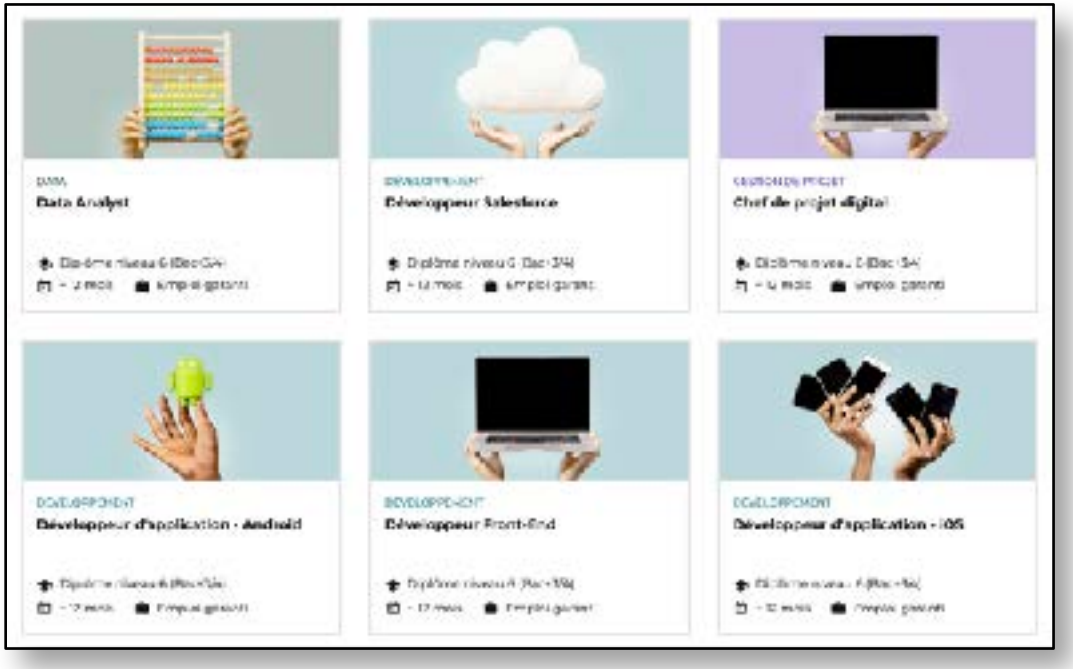
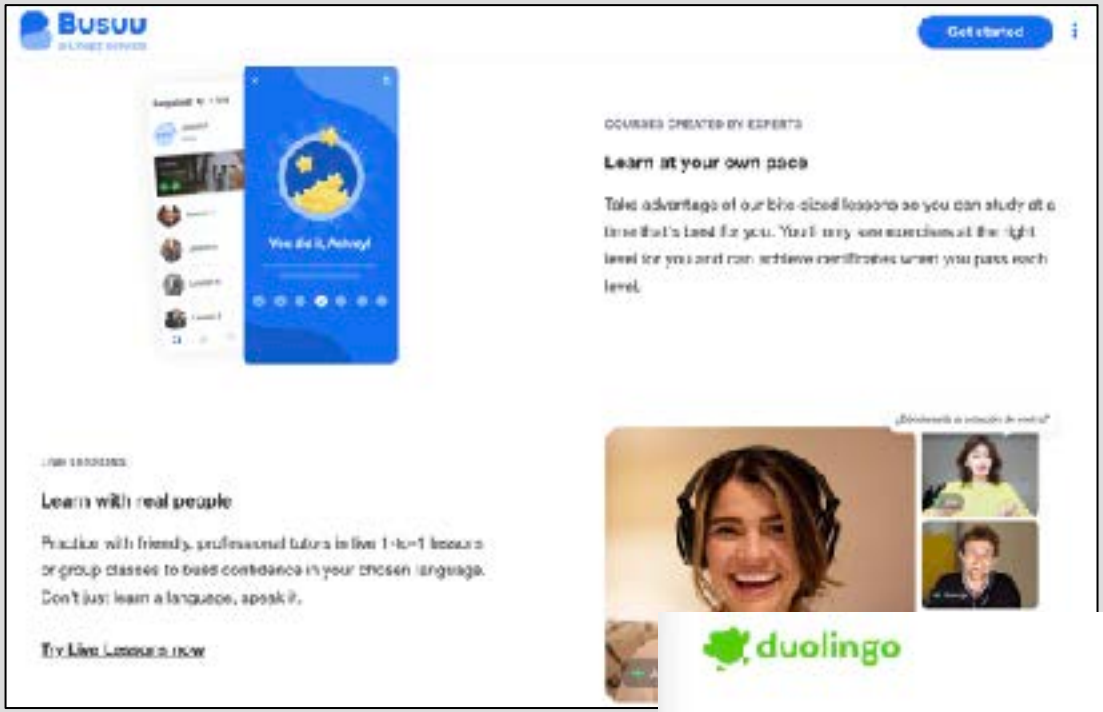


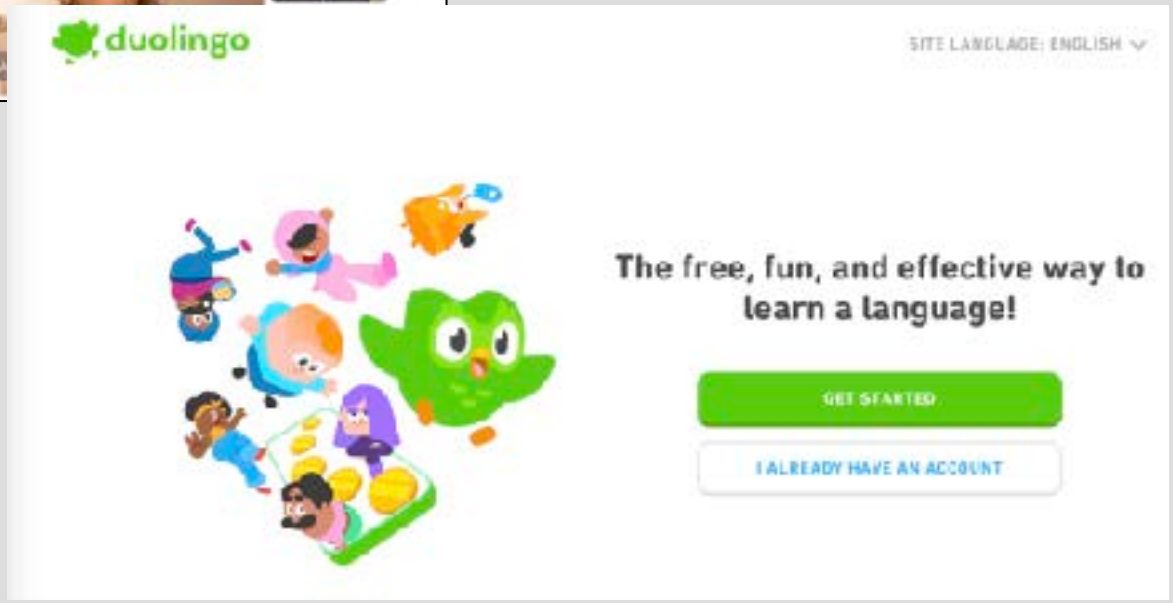

**CoorpAcademy**

**OpenClassroom**






120 millions users




110 millions users

DuoLingo, 110 million users

Severin Hacker, ETH graduate 2006

Busuu, 120 million users

Adrian Hilti, EPFL graduate 2001

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WhatsApp

zoom

Engageli

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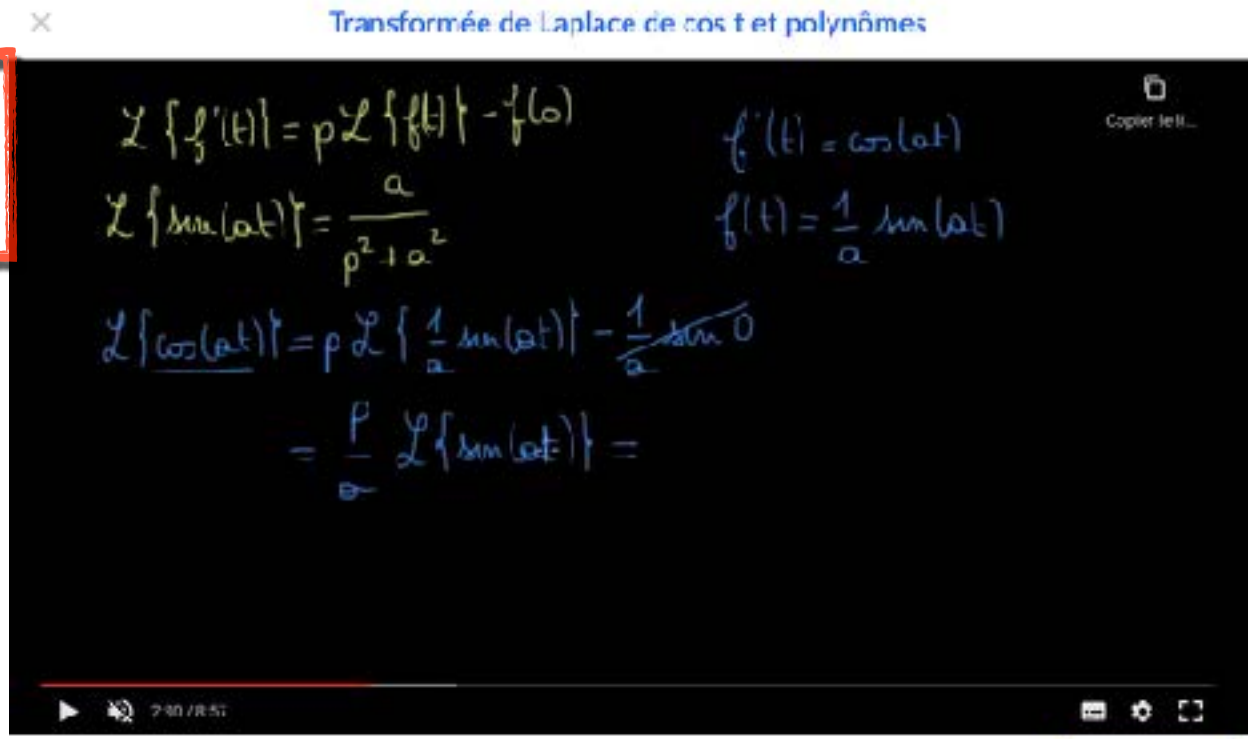


**Khan Academy**

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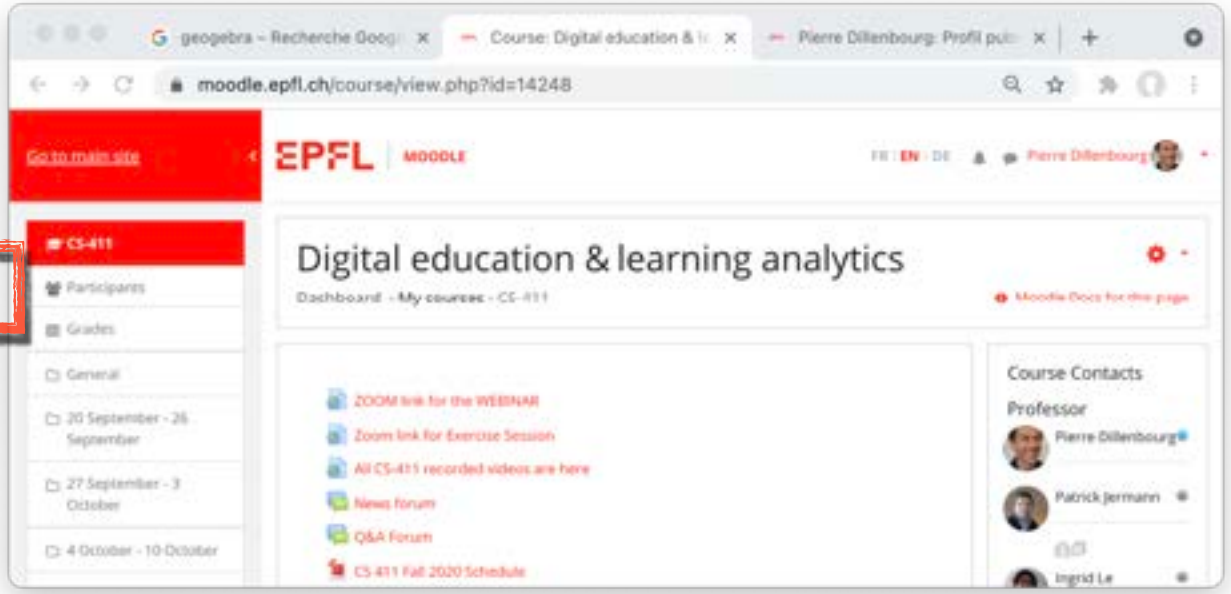


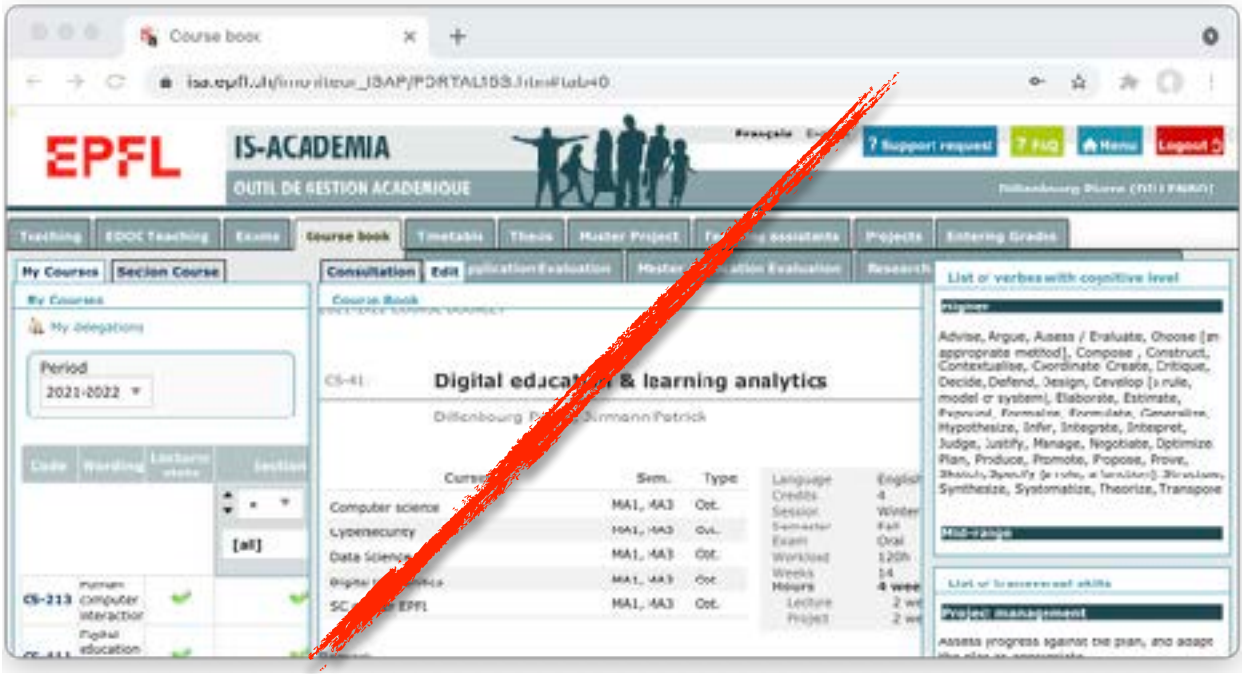

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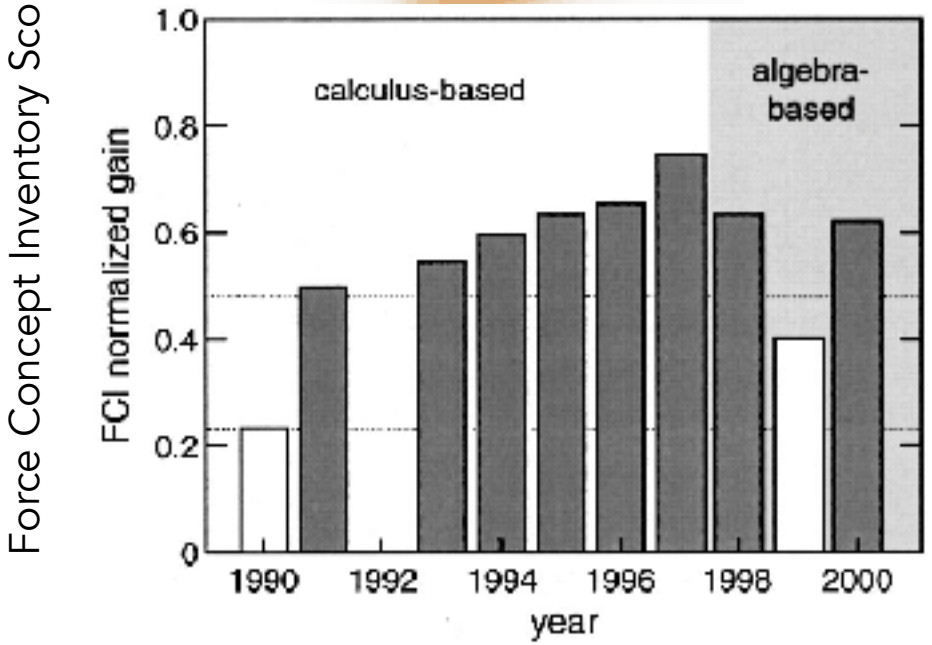


Crouch, C.H., & Mazur, E. (2001). Peer Instruction: Ten years of experience and results. *American Journal of Physics, 69*, 970-977.

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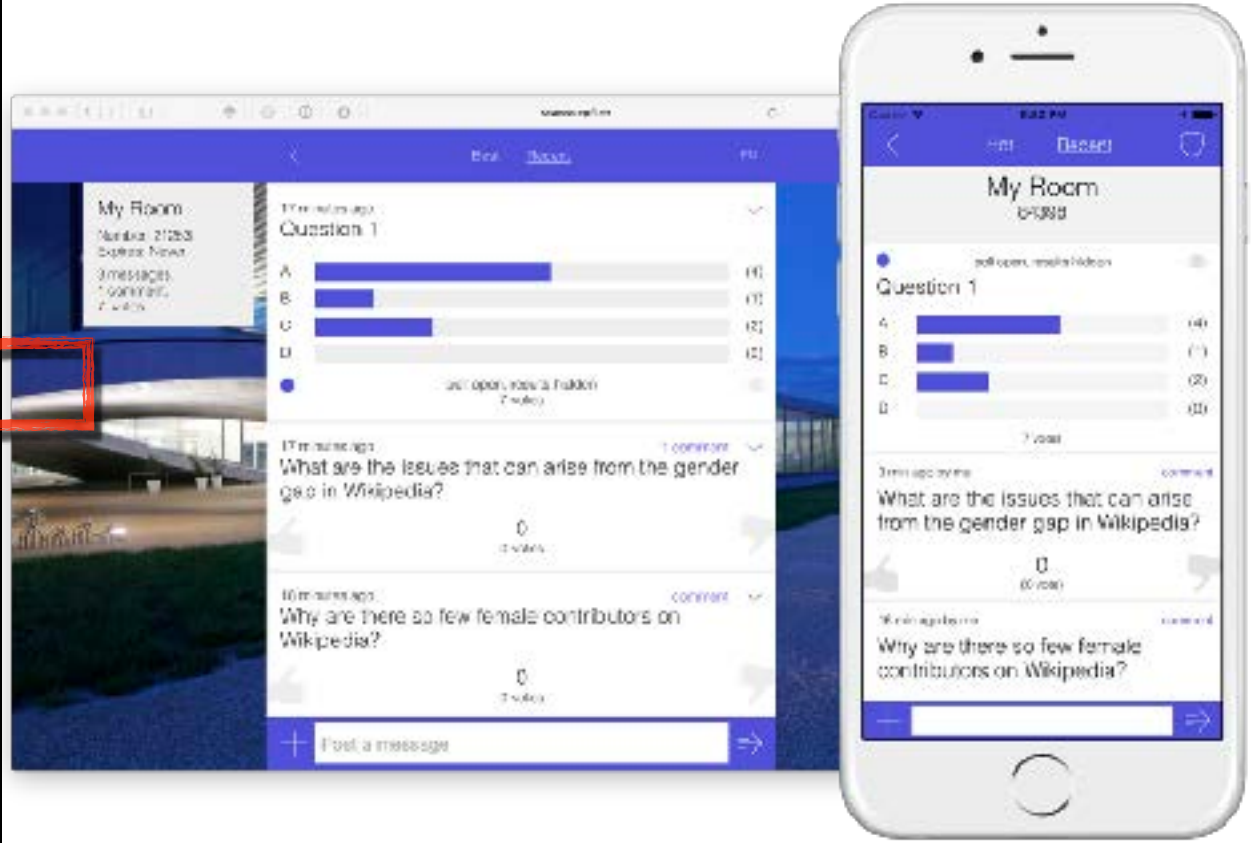


Speak Up

Drill & Practice

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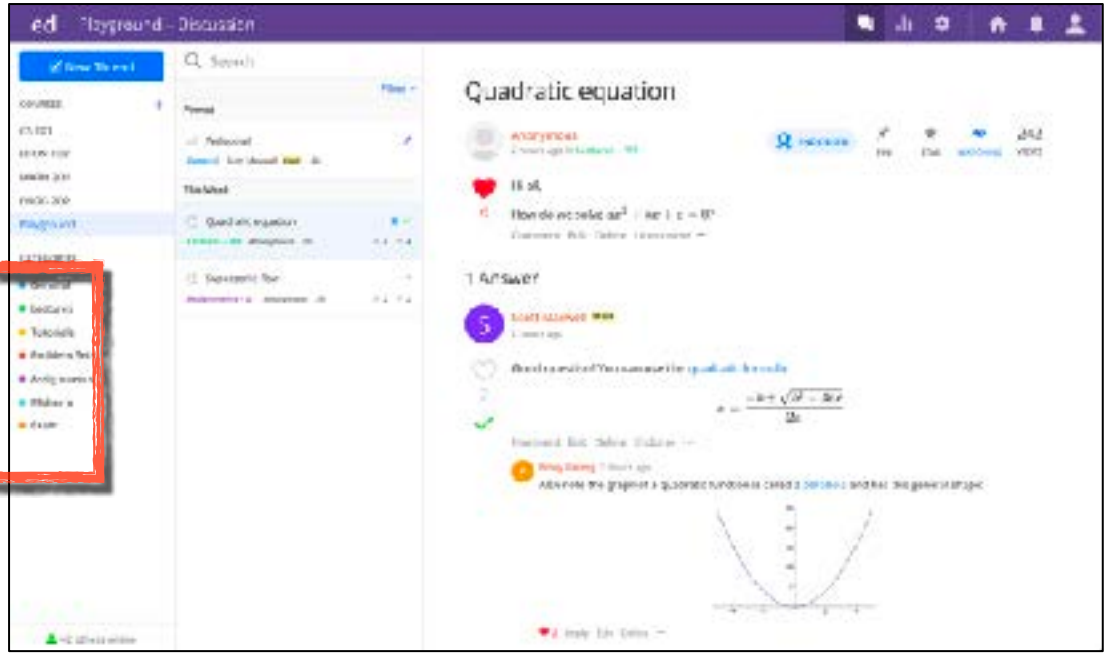


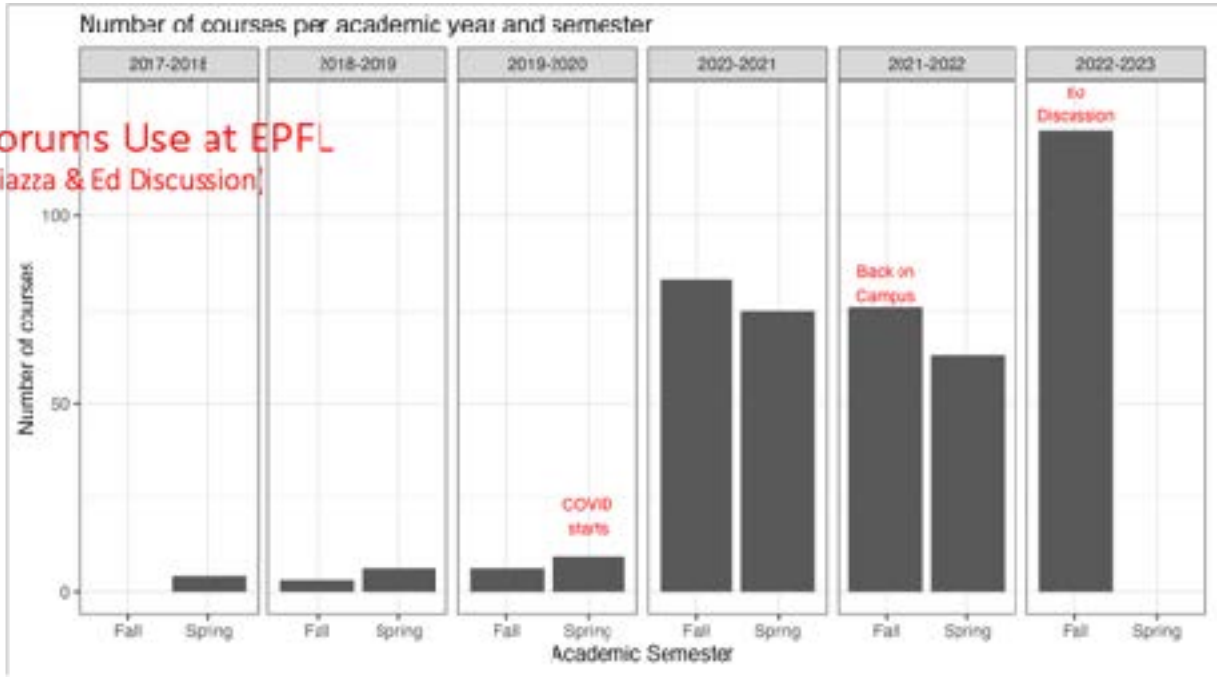

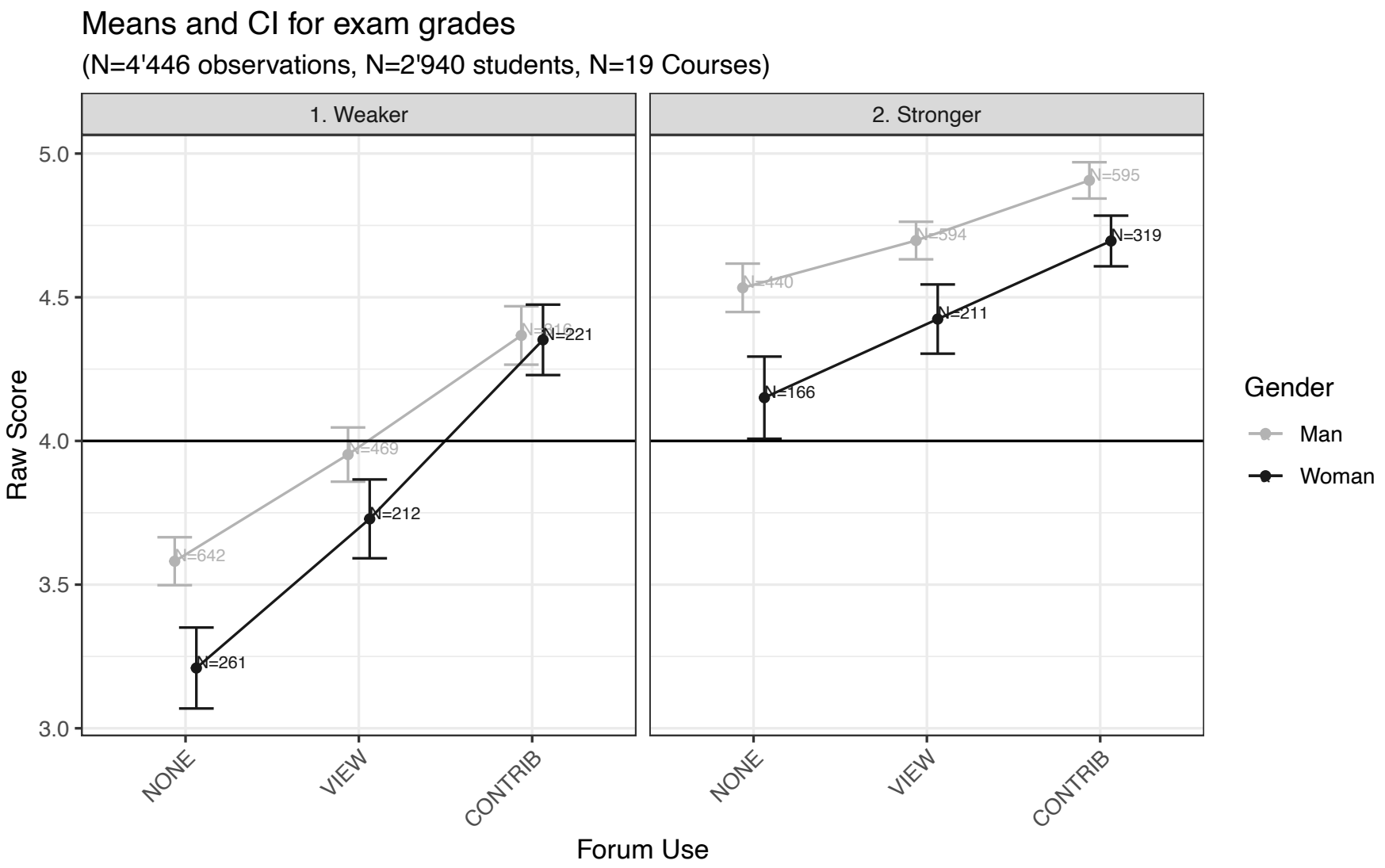
Means and CI for exam grades
(N=4'446 observations, N=2'940 students, N=19 Courses)
1. Weaker
2. Stronger
Raw Score
5.0
4.5
4.0
3.5
3.0
N=642
N=469
N=221
N=212
N=261
N=440
N=594
N=595
N=211
N=319
N=166
NONE
VIEW
CONTRIB
Forum Use
Gender
Man
Woman

Education is a data science

Drill & Practice

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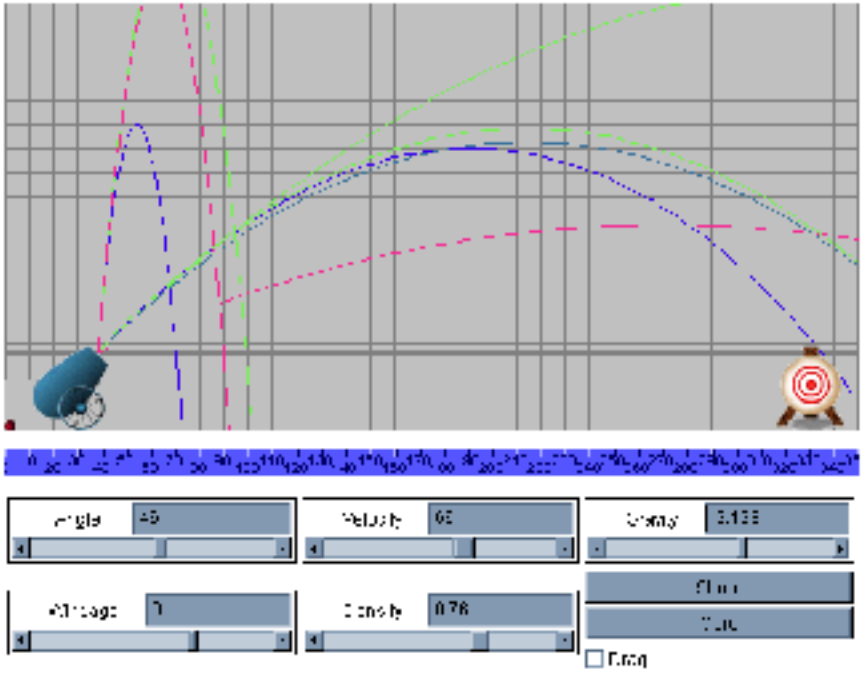

# Jupyter Notebook

Prof. Cecile Hebert, EPFL

https://www.epfl.ch/education/educational-initiatives/jupyter-notebooks-for-education/

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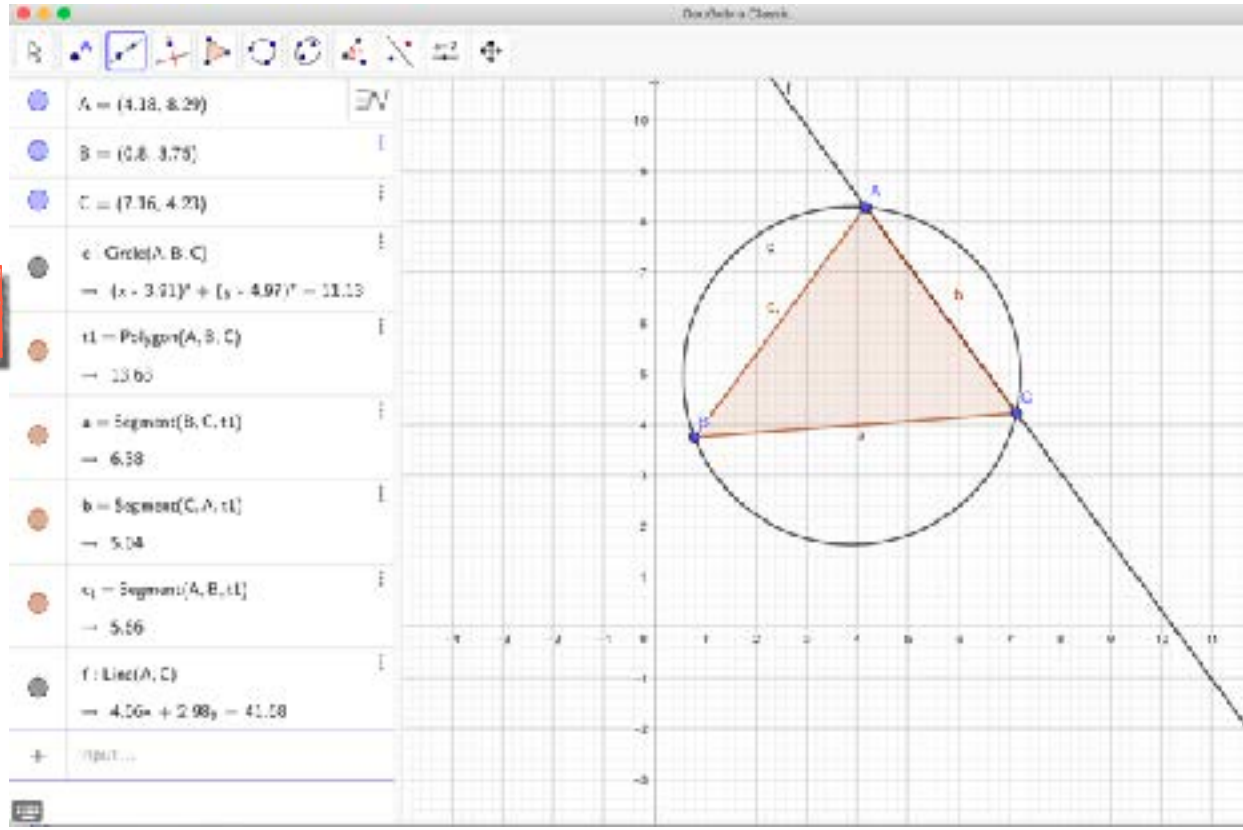

Geogebra

Drill & Practice

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Minecraft

Drill & Practice

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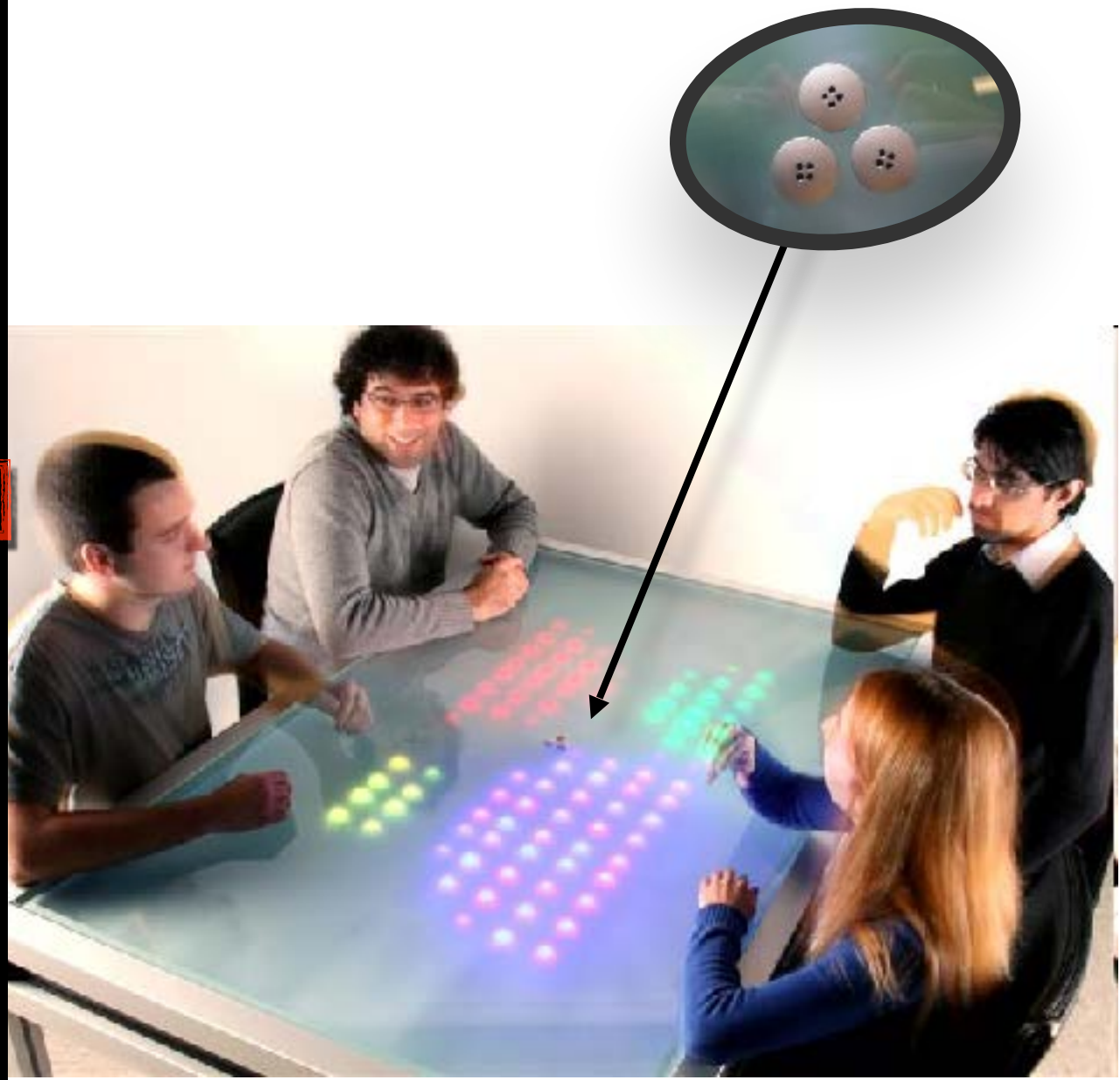

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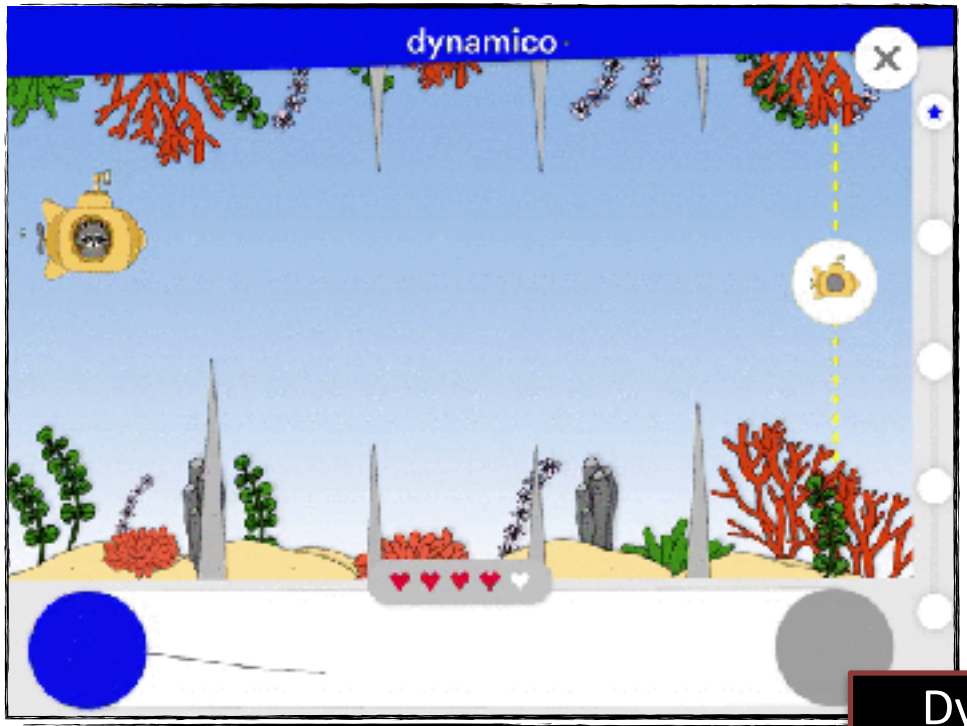
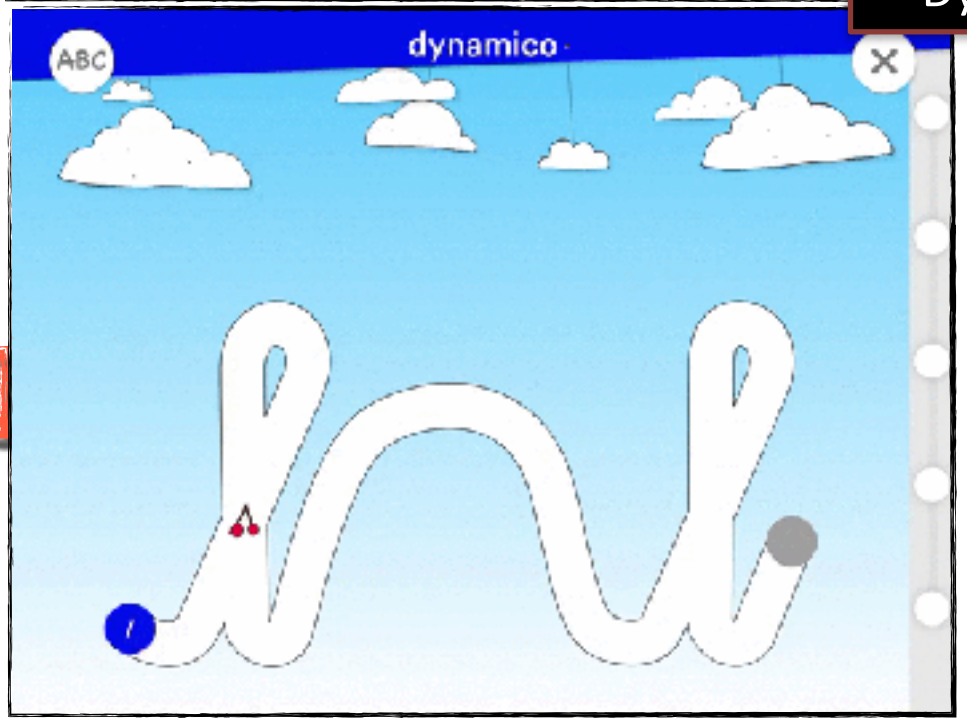



Dynamico



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Cellulo

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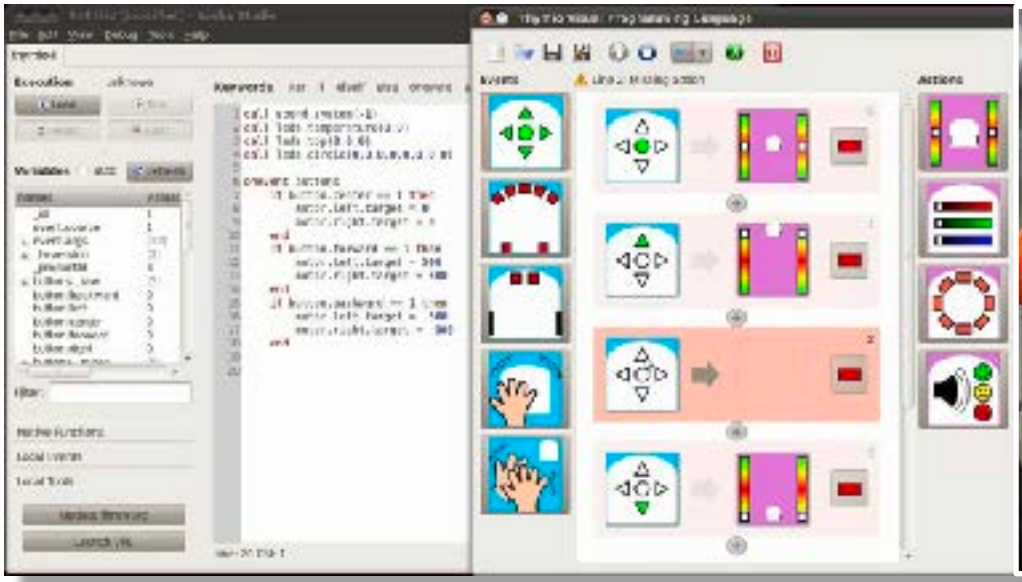
many technologies !

how do they support learning ?

how do we learn ?

**Education Content**
Digital Skills

**Education method**
Digital Tools

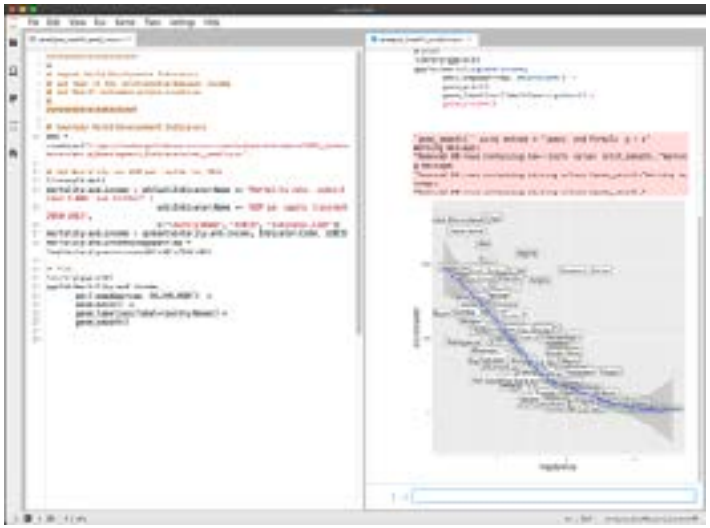


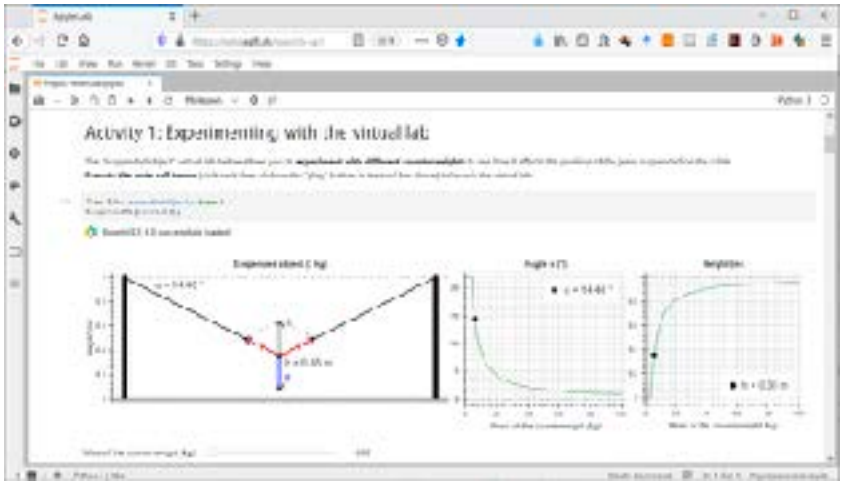
**Education Content**

Digital Skills: Data Sciences

**Education method**

Digital Tools: Physics






https://www.practicaldatascience.org/html/exercises/Exercise_jupyterlab.html#exercises-exercise-jupyterlab--page-root

**Digital Tools**

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**Digital Skills**

Computational thinking

Coding

Data analyses

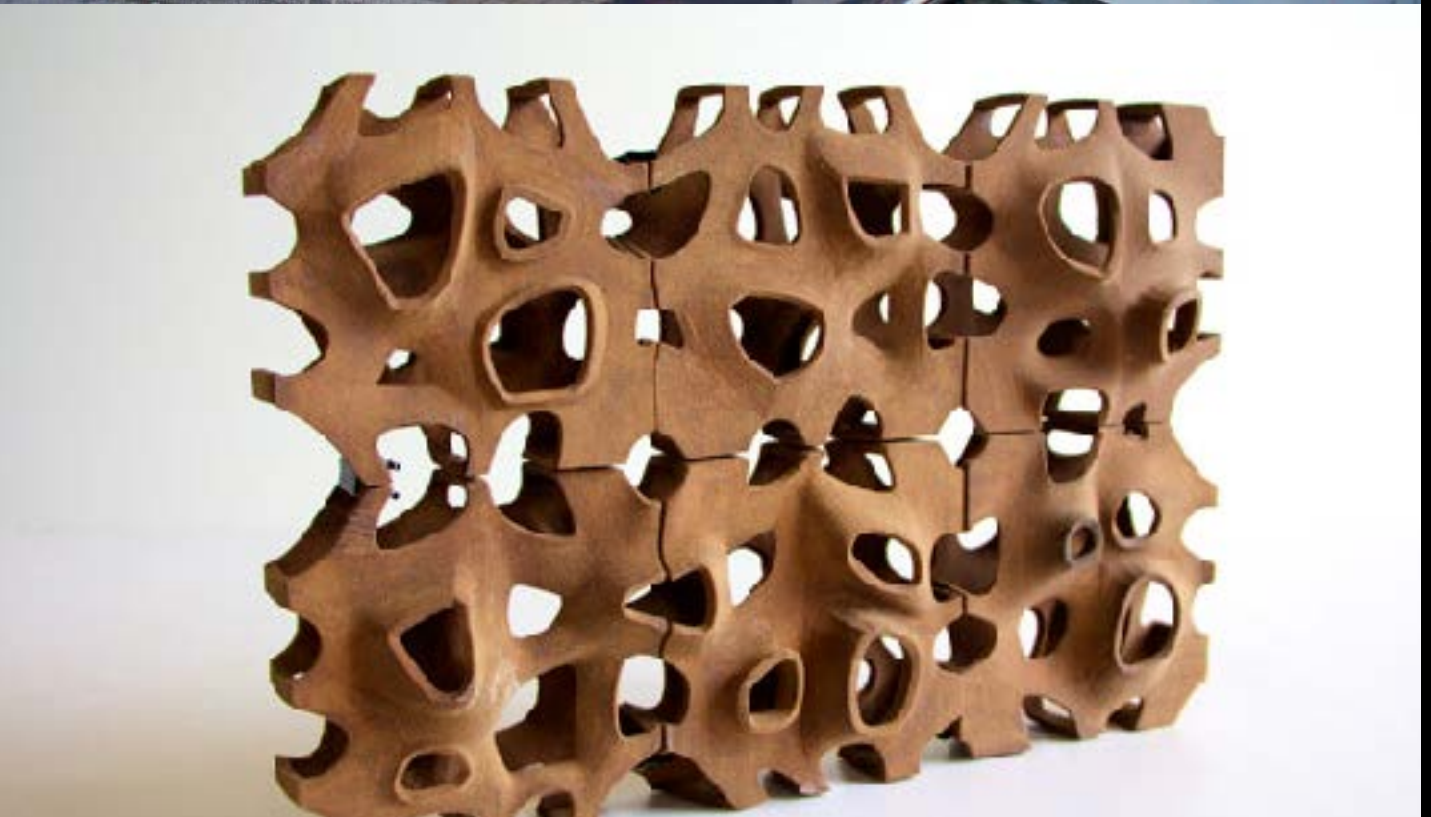
Makers spaces

Additive manufacturing

Sensors

IOT

Networks

**Digital Kills**

Computational thinking

Coding

Data analyses

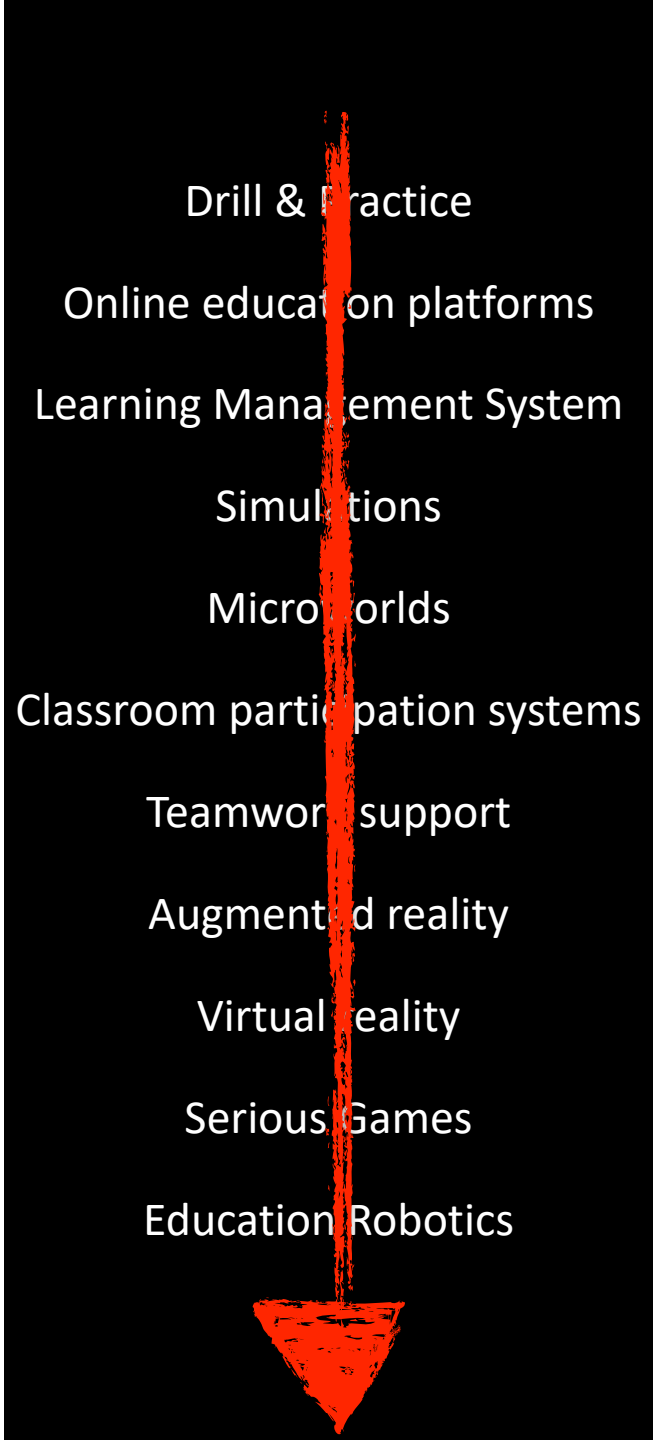
Makers spaces

Additive manufacturing

Sensors

IOT

Networks




How people learn

what learners learn
does not depend on right specific technology
but on the cognitive activity they do
(with this technology)

| Week | CS-411 | |
|---|---|---|
| | **Course** (Friday 10 :15 – 10 :00 in COViZ) | **Project** (Friday **12 :15**-14 :00 in INF 119) |
| W1 21/02 | Chapter 1: Learning technologies | Experience a PS-I approach (form groups, share all resources) |
| W2 28/02 | Chapter 2: Memory & Learning | Decide project idea |
| W3 07/03 | Chapter 3: Mastery Learning | Analyze the learning tasks (identify learning goals, tasks, interventions, blah) |
| W4 14/03 | Chapter 4: Discovery learning | Design scenario |
| W5 21/03 | Chapter 5: Designing Experiments | Implement the scenario |
| W6 28/03 | Chapter 6: Social Cognition | Implement the scenario |
| W7 04/04 | Chapter 7: Augmented reality | Implement the scenario |
| W8 11/04 | Chapter 8: Statistical analysis<br>*Patrick Jermann* | Implement the scenario |
| 18/04 25/04 | Easter Break | |
| W9 02/05 | Chapter 8: Statistical analysis<br>*Patrick Jermann* | Run experiments |
| W10 09/05 | *Chapter 9: Maker Spaces* | Run experiments |
| W11 16/05 | *Chapter 10: Computational thinking skills* | Analyse Data |
| W12 23/05 | *Chapter 11: Generative AI in Education* | Support for Statistical analysis<br>*Patrick Jermann* |
| W13 30/05 | | |

# CS-411 : 6 credits !!!

- Written Exam: see 2023 year exam on Moodle
- Project : Design an I-PS vs PS-I experiments
  - Teams of 3
  - Select a difficult topic to understand
  - Analyse de tasks
  - Design the PS and I learning Activities
  - Run the experiment
  - Run the statistical analysis
  - Write the report

All instructions on Moodle and at 12:30

# What will learners  learn ?

(not something trivial)

Some of the topics you can choose from include:

1. Bayes' theorem
2. Recursion
3. Entropy in physics
4. Information entropy
5. Gradient Descent
6. Gerrymandering

Other topics are acceptable, but please discuss with one of the TAs first before submitting.

# Final Report

(not something trivial)

1. Introduction (½ page)
    a. Introduce the topic
    b. Introduce the target audience as defined in the tasks
2. Learning Goals (½ page)
3. Task Analysis (1-2 pages)
4. Lesson Design and Activities (1-2 pages)
5. Experimental Design (1 page)
6. Implementation (1-2 pages)
7. Participants, Data, and Analysis (1-2 pages)
8. Conclusions and Reflection (½-1 page)