

CS-411 : Digital Education

Chapter 1:

Introduction to digital education

Digital education

MED21124 CS-411 Cours

Digital education

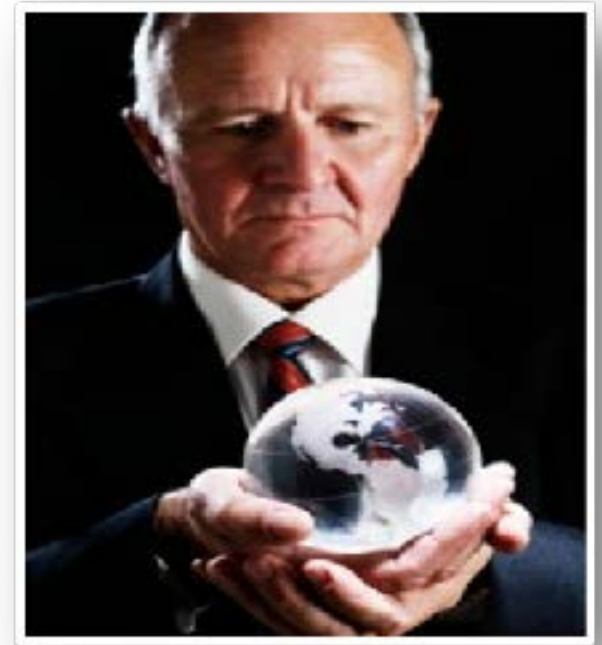
MED21124 CS-411 Cours

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

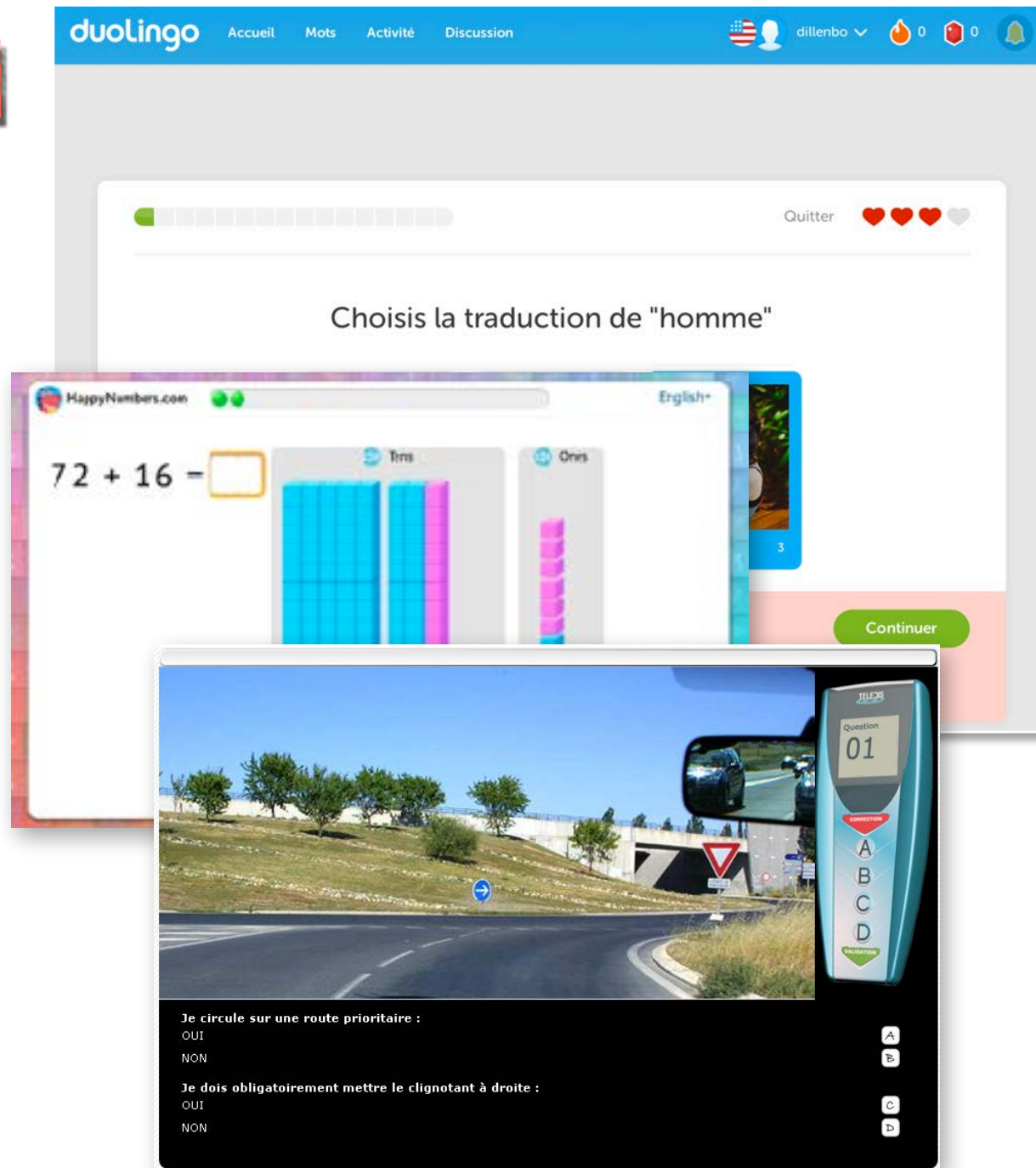
Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics



Drill & Practice

Online education platforms

Learning Management System

Classroom participation systems

Simulations

Microworlds

Teamwork support

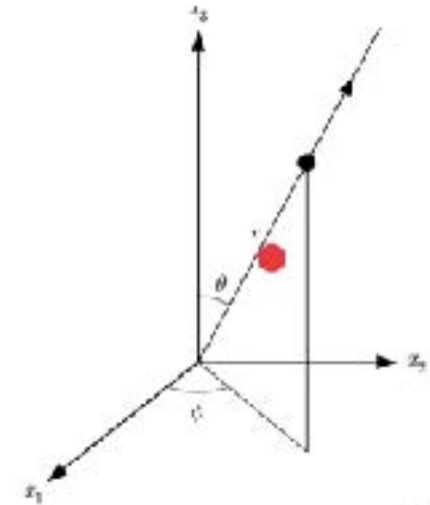
Augmented reality

Virtual reality

Serious Games

Education Robotics

Définition : lignes de coordonnées (c. sphériques)



Mathématiques 2 2018 18

EdX
Coursera

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

Drill & Practice

Online education platforms

Learning Management System

Classroom participation systems

Simulations

Microworlds

Teamwork support

Augmented reality


Virtual reality

Serious Games

Education Robotics



Mathrix

The background of the slide is dark with decorative circuit traces in the corners. The traces are colored in green, red, and blue, and are arranged in a complex, interconnected pattern that resembles a printed circuit board (PCB) layout. The traces are more prominent in the corners and fade out towards the center.

Matériaux avec des électrons libres

EPFL

Professor Anna Fontcuberta i Morral (EPFL)

Drill & Practice

Online education platforms

Learning Management System

Classroom participation systems

Simulations

Microworlds

Teamwork support

Augmented reality

Virtual reality

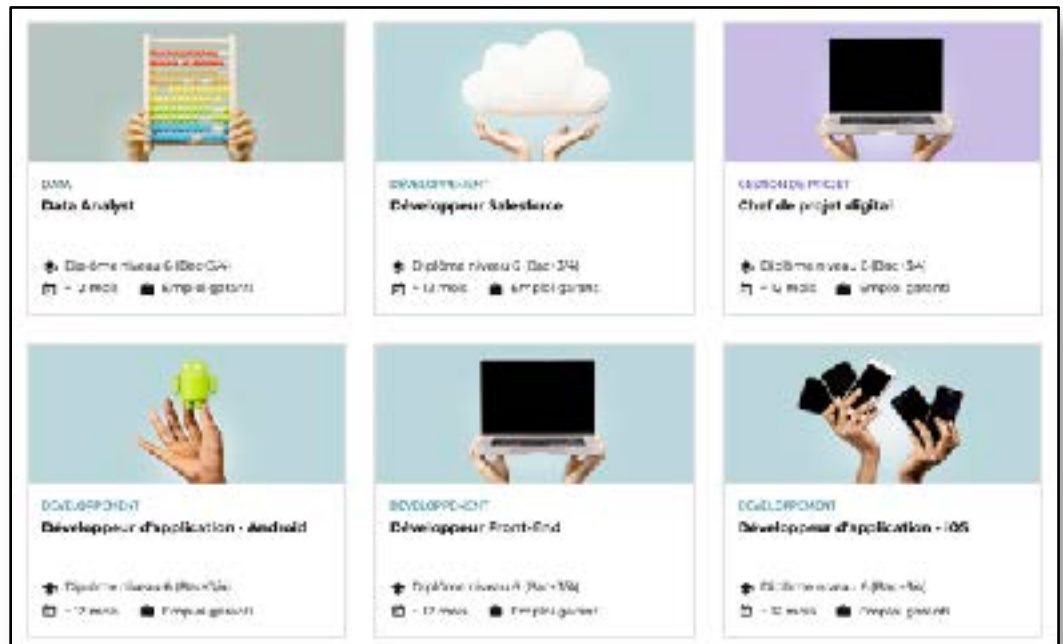
Serious Games

Education Robotics



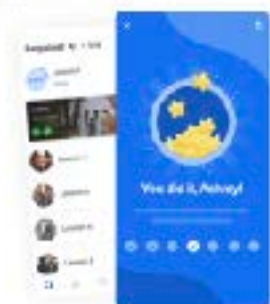
CoopAcademy

OpenClassroom



BUSUU
BILINGUAL COACHES

Get started



COURSES CREATED BY EXPERTS


Learn at your own pace

Take advantage of our bite-sized lessons as you can study at a time that's best for you. You'll try some exercises at the right level for you and can achieve certificates when you pass each level.

Learn with real people

Practice with friendly, professional tutors in live 1-to-1 lessons or group classes to build confidence in your chosen language. Don't just learn a language, speak it.


Try Live Lessons now



120 millions users

duolingo

SITE LANGUAGE: ENGLISH



The free, fun, and effective way to learn a language!

GET STARTED

I ALREADY HAVE AN ACCOUNT

110 millions users

DuoLingo, 110 million users



Severin Hacker, ETH graduate 2006

Busuu, 120 million users



Adrian Hilti, EPFL graduate 2001

Drill & Practice

Online education platforms

Learning Management System

Classroom participation systems

Simulations

Microworlds

Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics



Engageli

Drill & Practice

Online education platforms

Learning Management System

Classroom participation systems

Simulations

Microworlds

Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics

Transformée de Laplace de $\cos t$ et polynômes

$$\mathcal{L}\{f'(t)\} = p\mathcal{L}\{f(t)\} - f(0)$$
$$\mathcal{L}\{\sin(at)\} = \frac{a}{p^2 + a^2}$$
$$\mathcal{L}\{\cos(at)\} = p\mathcal{L}\left\{\frac{1}{a}\sin(at)\right\} - \frac{1}{a}\sin 0$$
$$= \frac{p}{a}\mathcal{L}\{\sin(at)\} =$$

$f'(t) = \cos(at)$
 $f(t) = \frac{1}{a}\sin(at)$

7:30 / 8:51

Khan Academy

Comparer des fractions qui n'ont ni le même numérateur ni le même dénom...

Compare les fractions suivantes en utilisant les symboles $>$, $<$, ou $=$.

$\frac{5}{3} > \frac{10}{8}$

Bravo ! Pour aller plus loin.

Signaler un problème

Excellent travail!

Continuez. [Voici comment nous avons répondu.](#)

Réussissez 5 questions sur 7 pour passer à Familier

Question suivante...

Drill & Practice

Online education platforms

Learning Management System

Classroom participation systems

Simulations

Microworlds

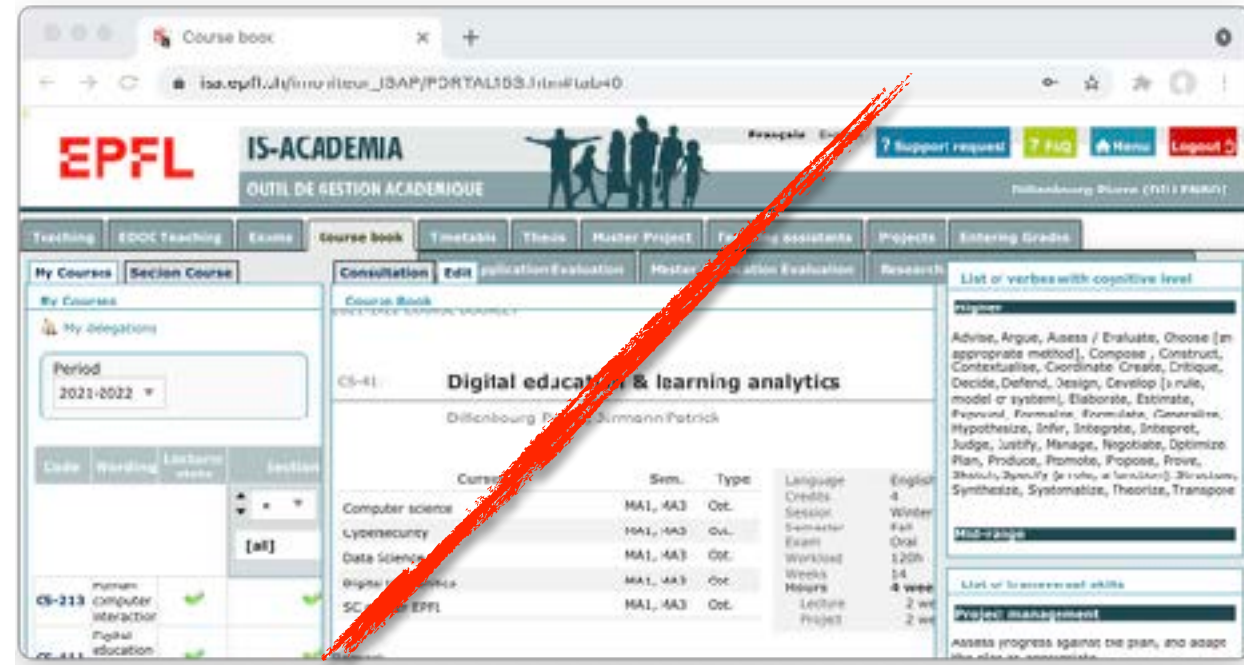
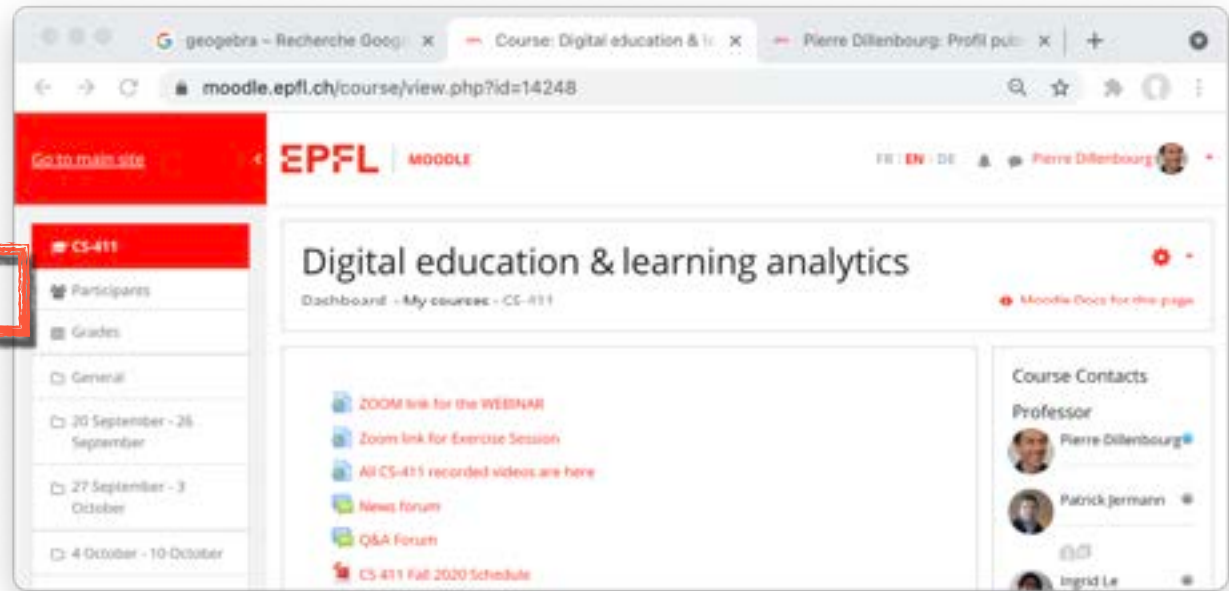
Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics



Drill & Practice

Online education platforms

Learning Management System

Classroom participation systems

Simulations

Microworlds

Teamwork support

Augmented reality

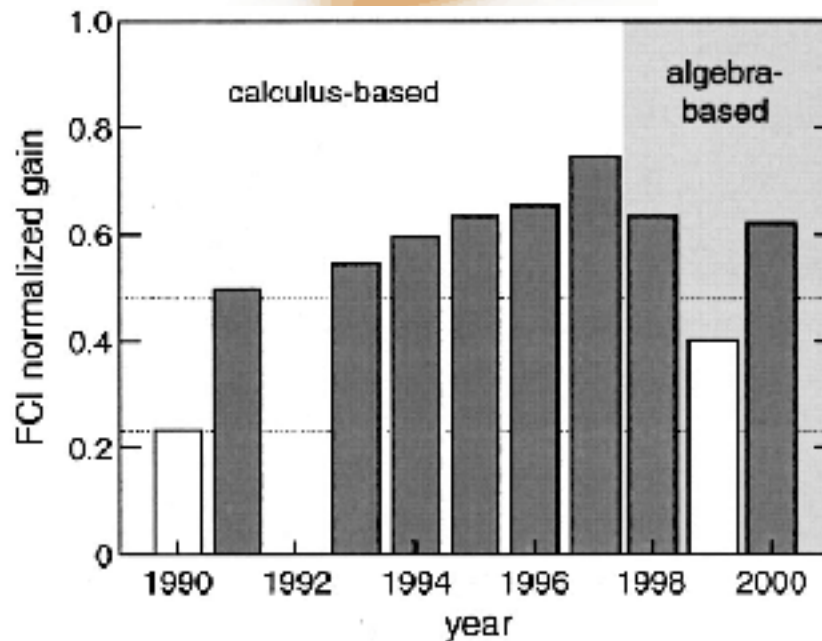
Virtual reality

Serious Games

Education Robotics



Force Concept Inventory Score



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

Drill & Practice

Online education platforms

Learning Management System

Classroom participation systems

Simulations

Microworlds

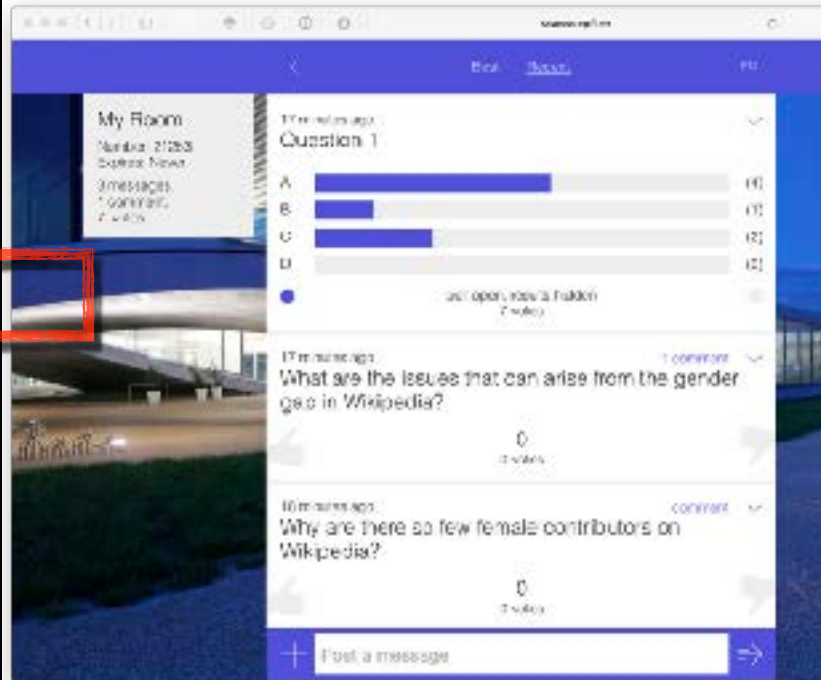
Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics



Speak Up

Drill & Practice

Online education platforms

Learning Management System

Classroom participation systems

Simulations

Microworlds

Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics

ed Playground - Discussion

Search

Quadratic equation

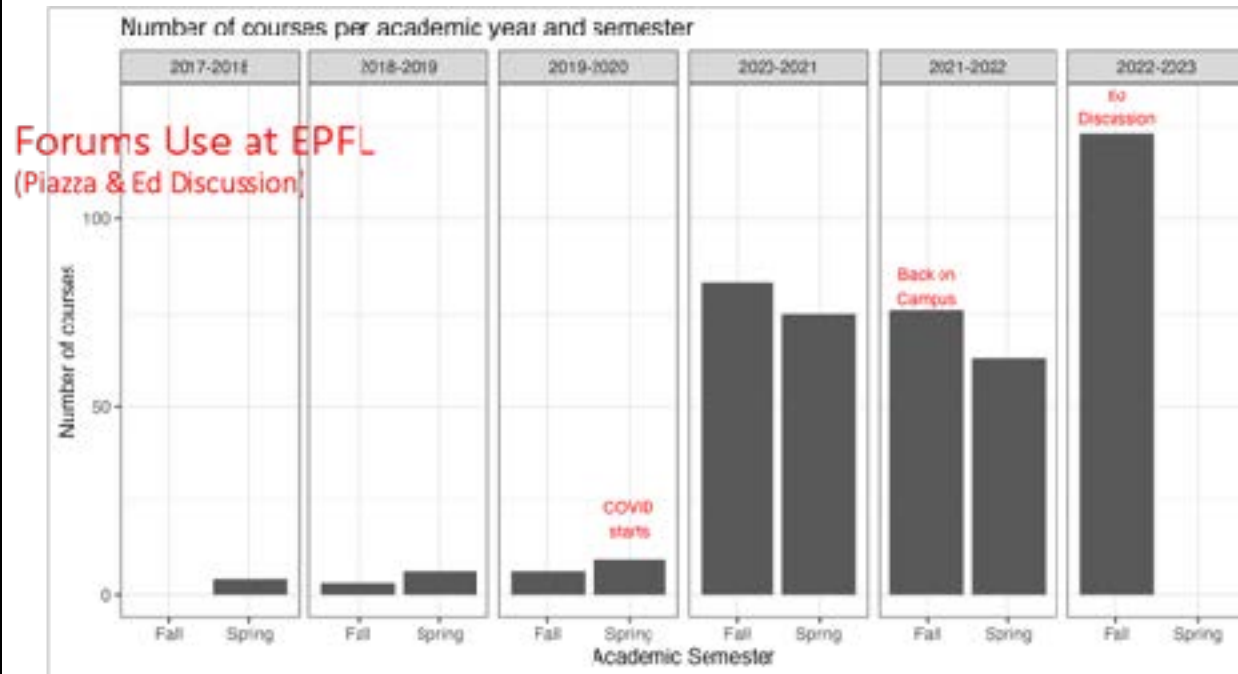
How do we solve $ax^2 + bx + c = 0$?

Answer

How do we solve $ax^2 + bx + c = 0$?

Answer

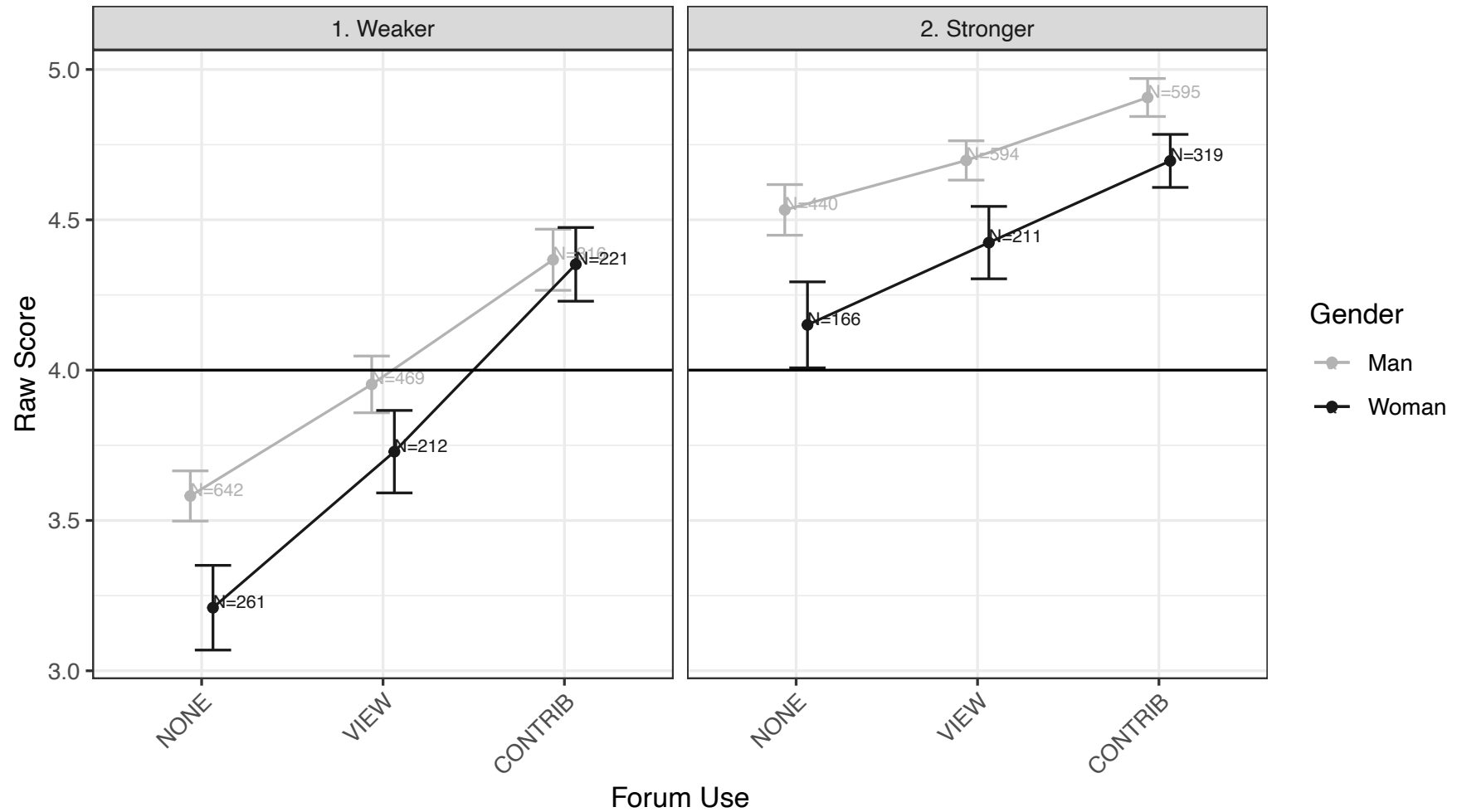
How do we solve $ax^2 + bx + c = 0$?





Means and CI for exam grades

(N=4'446 observations, N=2'940 students, N=19 Courses)



Education is a data science

Drill & Practice

Online education platforms

Learning Management System

Simulations

Microworlds

Classroom participation systems

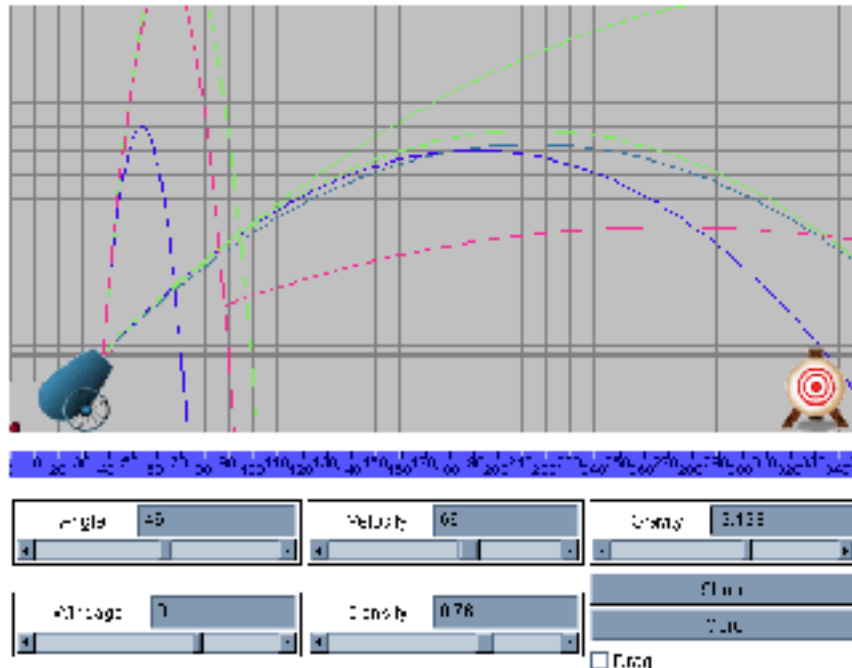
Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics



Jupyter Notebook



Prof. Cecile Hebert, EPFL

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

Drill & Practice

Online education platforms

Learning Management System

Simulations

Microworlds

Classroom participation systems

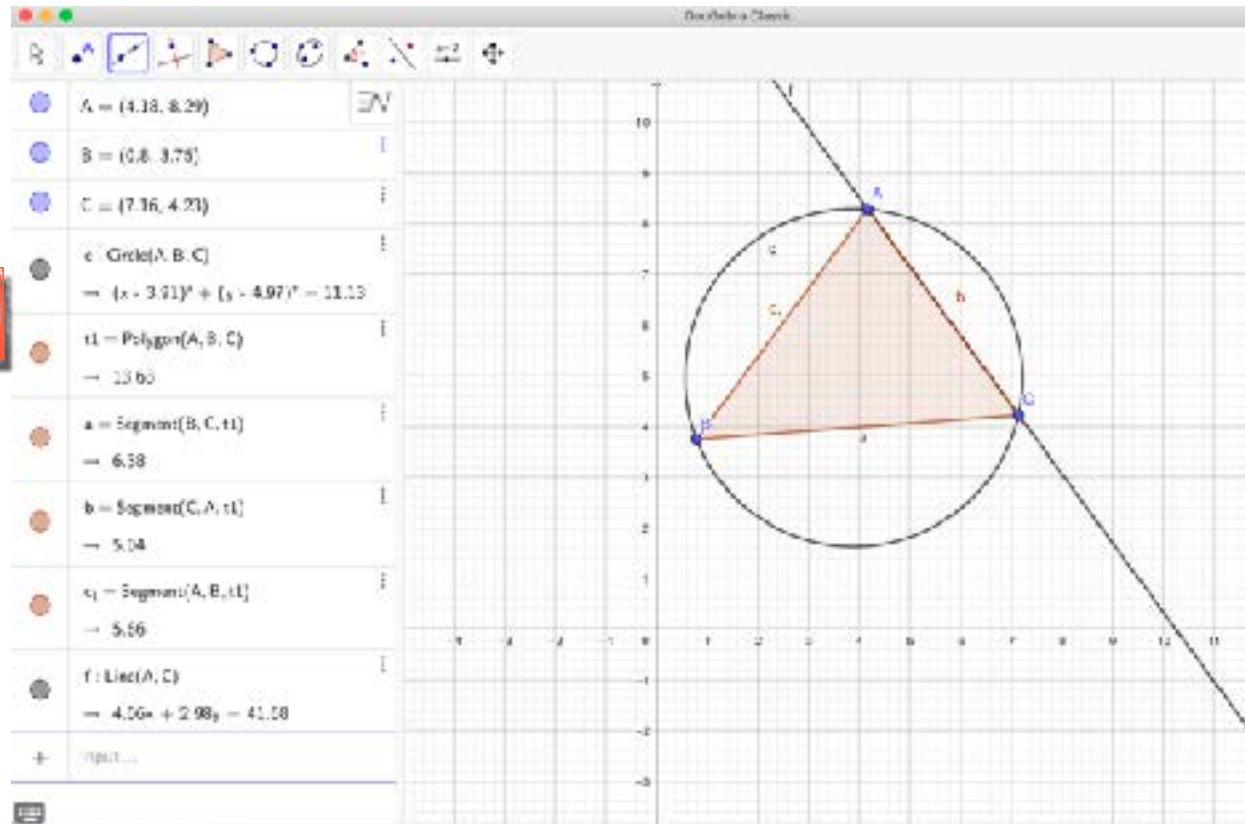
Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics



Geogebra

Drill & Practice

Online education platforms

Learning Management System

Classroom participation systems

Simulations

Microworlds

Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics



Minecraft

Drill & Practice

Online education platforms

Learning Management System

Classroom participation systems

Simulations

Microworlds

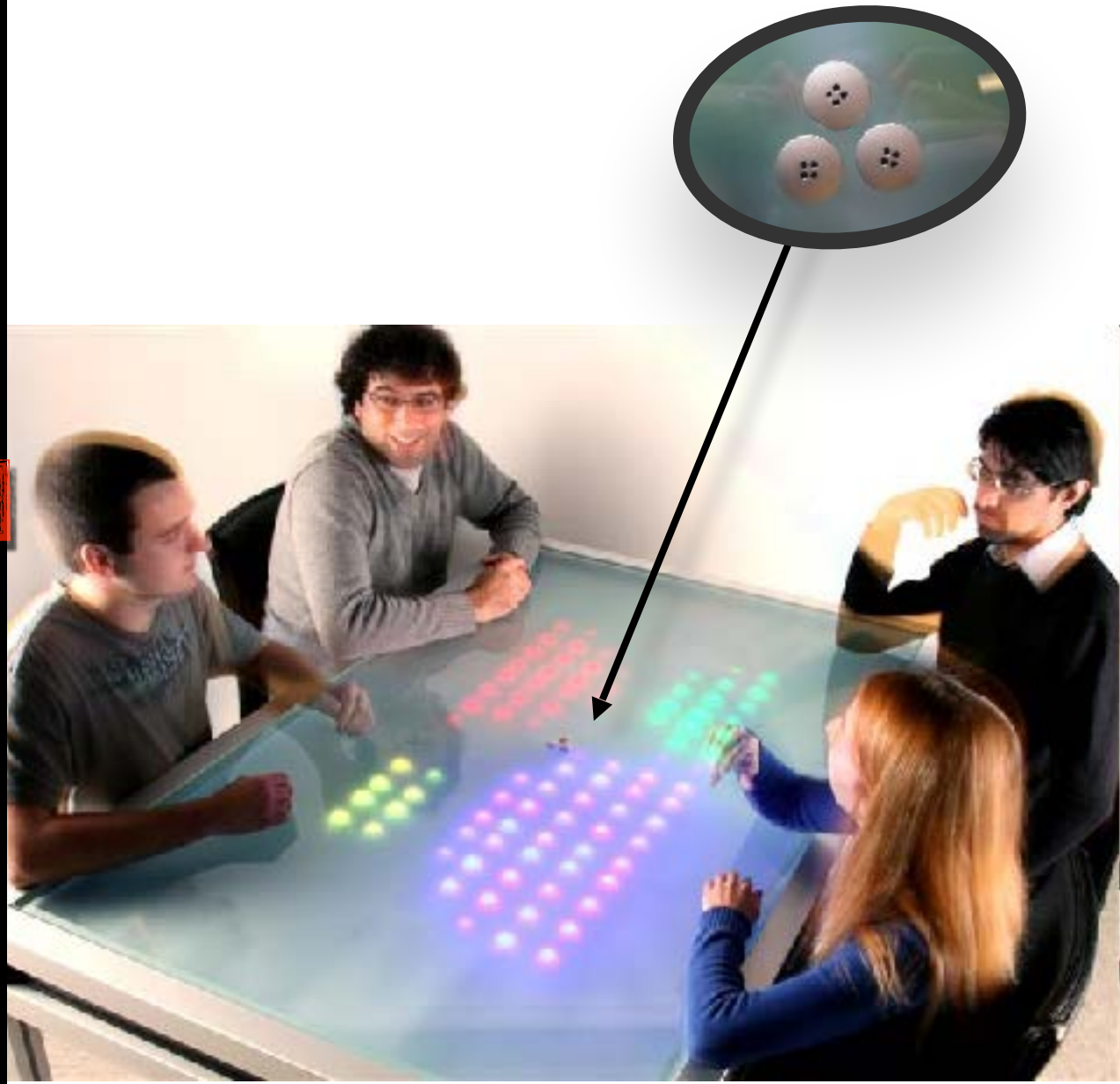
Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics



Drill & Practice

Online education platforms

Learning Management System

Simulations

Microworlds

Classroom participation systems

Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics



Drill & Practice

Online education platforms

Learning Management System

Simulations

Microworlds

Classroom participation systems

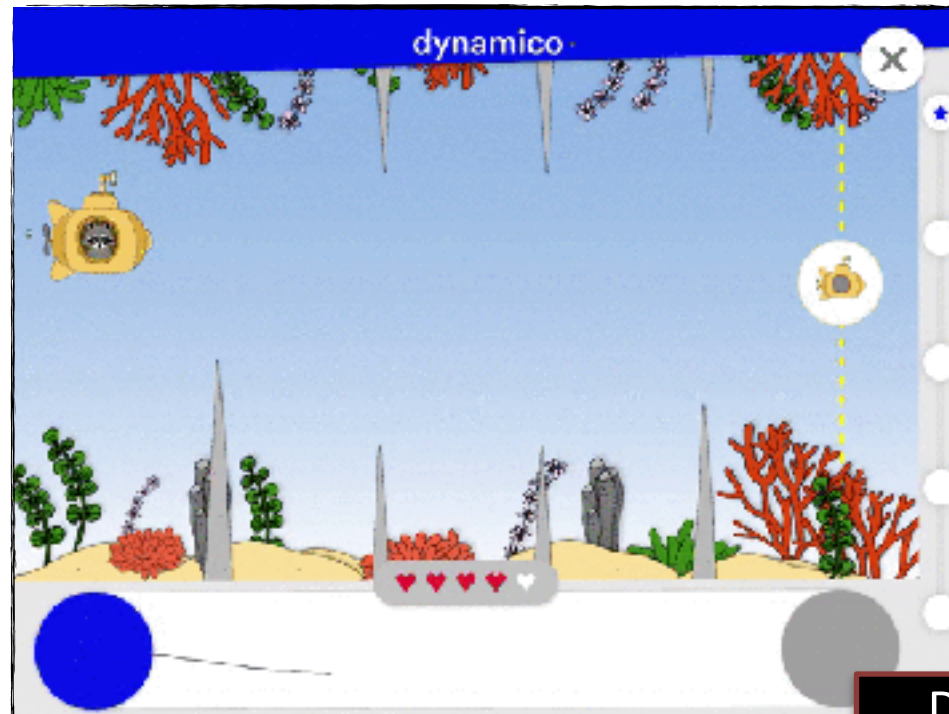
Teamwork support

Augmented reality

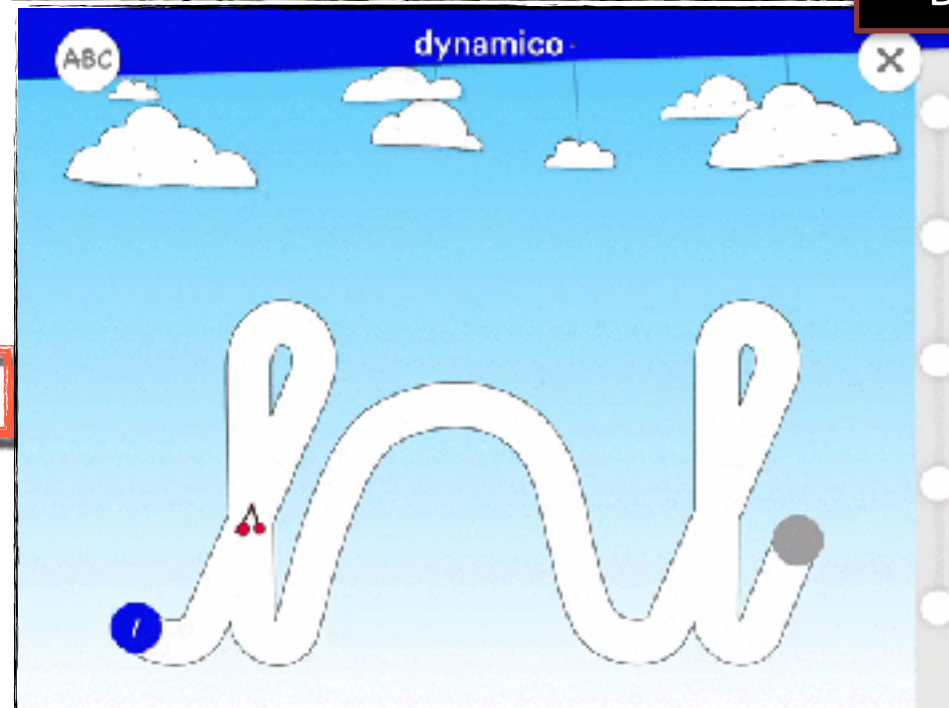
Virtual reality

Serious Games

Education Robotics



Dynamico



Drill & Practice

Online education platforms

Learning Management System

Simulations

Microworlds

Classroom participation systems

Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics



thymio



Cellulo



Drill & Practice

Online education platforms

Learning Management System

Classroom participation systems

Simulations

Microworlds

Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics

many technologies !

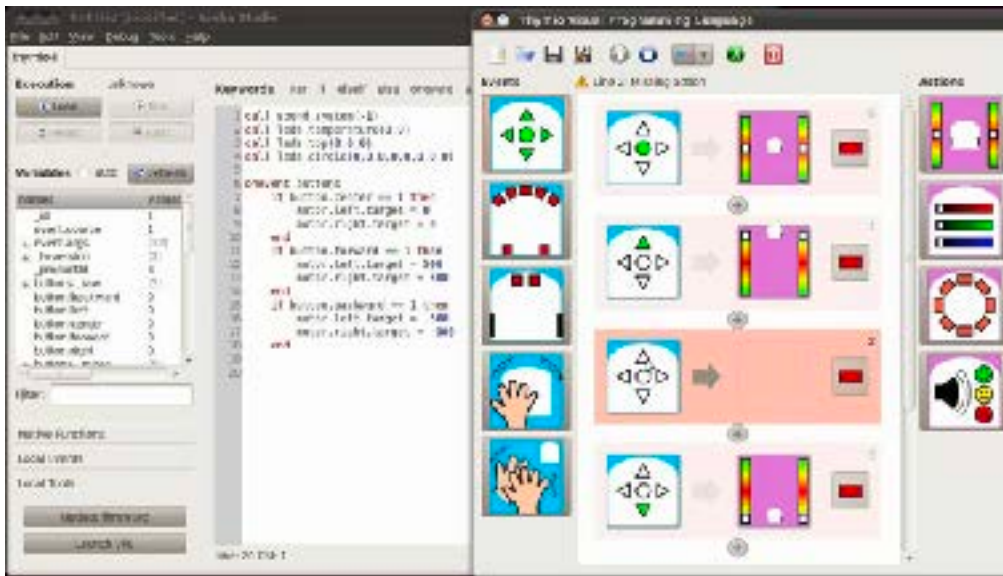
how do they support learning ?

how do we learn ?

Education Content

Digital Skills

Education method

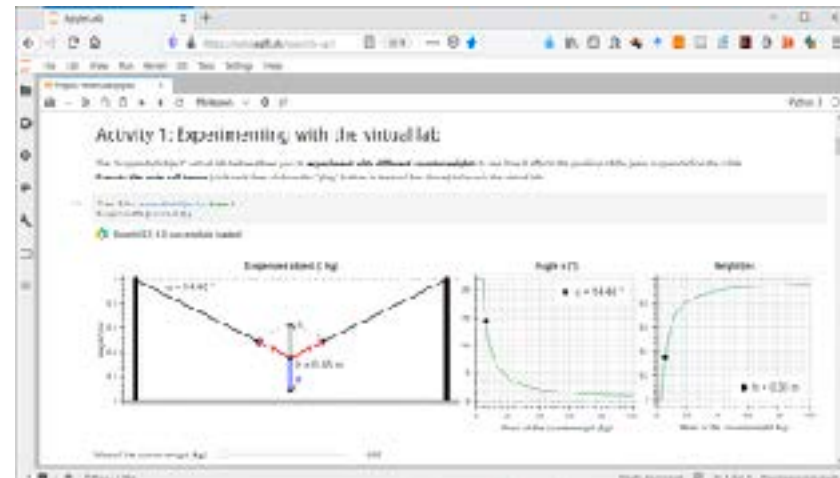
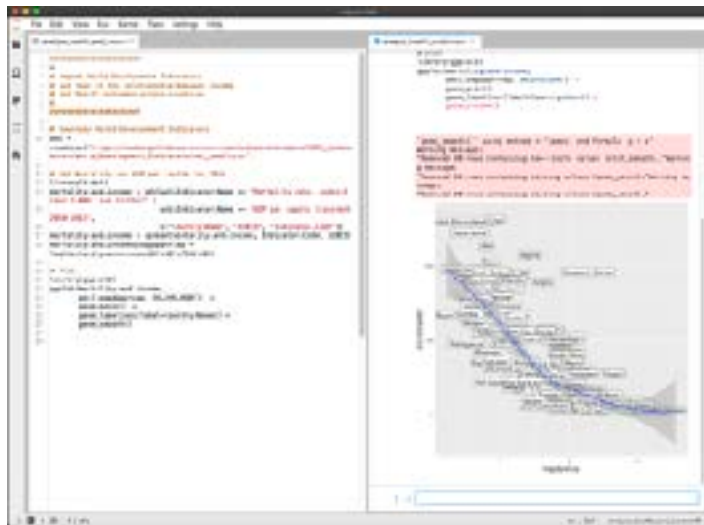


Education Content

Digital Skills: Data Sciences

Education method

Digital Tools: Physics



Digital Tools

Drill & Practice

Online education platforms

Learning Management System

Simulations

Microworlds

Classroom participation systems

Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics



Digital Skills

Computational thinking

Coding

Data analyses

Makers spaces

Additive manufacturing

Sensors

IOT

Networks



Digital Kills

Computational thinking

Coding

Data analyses

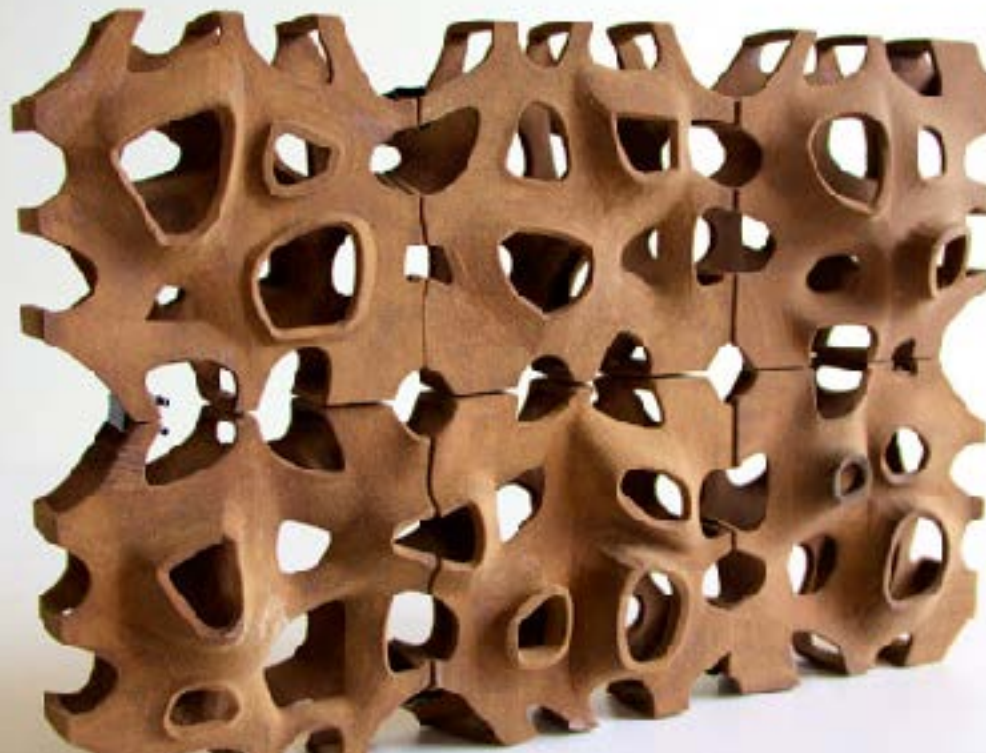
Makers spaces

Additive manufacturing

Sensors

IOT

Networks



Drill & Practice

Online education platforms

Learning Management System

Simulations

Micro worlds

Classroom participation systems

Teamwork support

Augmented reality

Virtual reality

Serious Games

Education Robotics

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 <i>Patrick Jermann</i>	Implement the scenario
18/04 25/04	Easter Break	
W9 02/05	Chapter 8: Statistical analysis <i>Patrick Jermann</i>	Run experiments
W10 09/05	<i>Chapter 9: Maker Spaces</i>	Run experiments
W11 16/05	<i>Chapter 10: Computational thinking skills</i>	Analyse Data
W12 23/05	<i>Chapter 11: Generative AI in Education</i>	Support for Statistical analysis <i>Patrick Jermann</i>
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 ($\frac{1}{2}$ page)
 - a. Introduce the topic
 - b. Introduce the target audience as defined in the tasks
2. Learning Goals ($\frac{1}{2}$ 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 ($\frac{1}{2}$ -1 page)