

CS-411 : Digital Education & Learning Analytics

Chapter 1: Introduction to digital education

How do people learn ?

How we help them to learn ?

How do we design activities that make them learn ?

How can digital technologies enhance these activities ?

HOW PEOPLE LEARN

Connect with your EPFL account

Go to Moodle CS-411

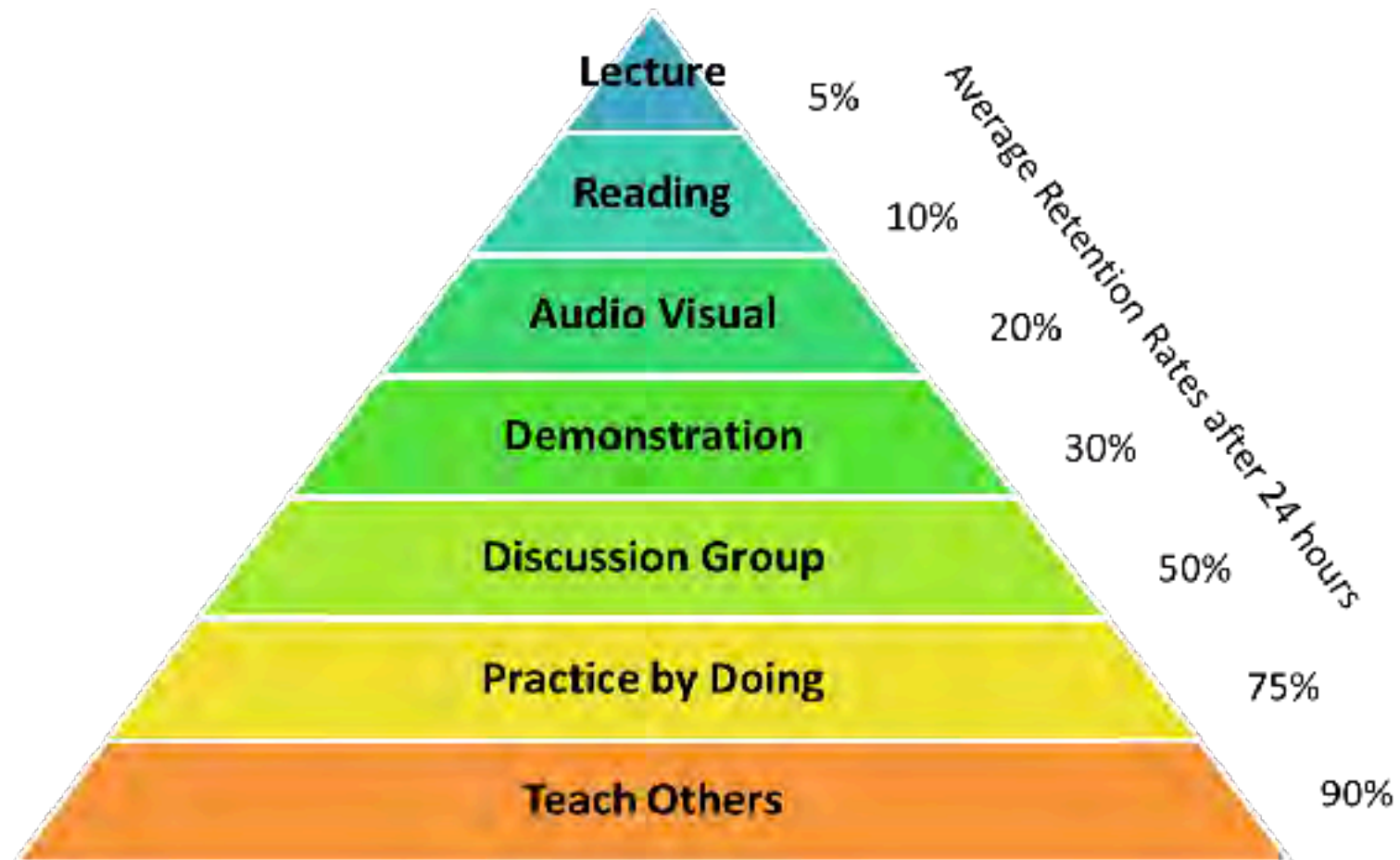
Select the first URL to FROG on week 1

How do you learn (before exams) ?



HOW PEOPLE LEARN

The Learning Pyramid



Source: National Training Laboratories, Bethel Maine

HOW PEOPLE LEARN depends also upon WHAT PEOPLE LEARN

- $3 \times 3 = 9$
- $35'467 + 36'489$
- $3/4 = 27/36$
- $P(A|B) = \frac{P(B|A) P(A)}{P(B)}$
- Behaviorism (Skinner)
- Master Learning (Bloom)
- Constructivism (Piaget*)
- Socio-Cultural theory (Vygostky*)

How do people learn ?

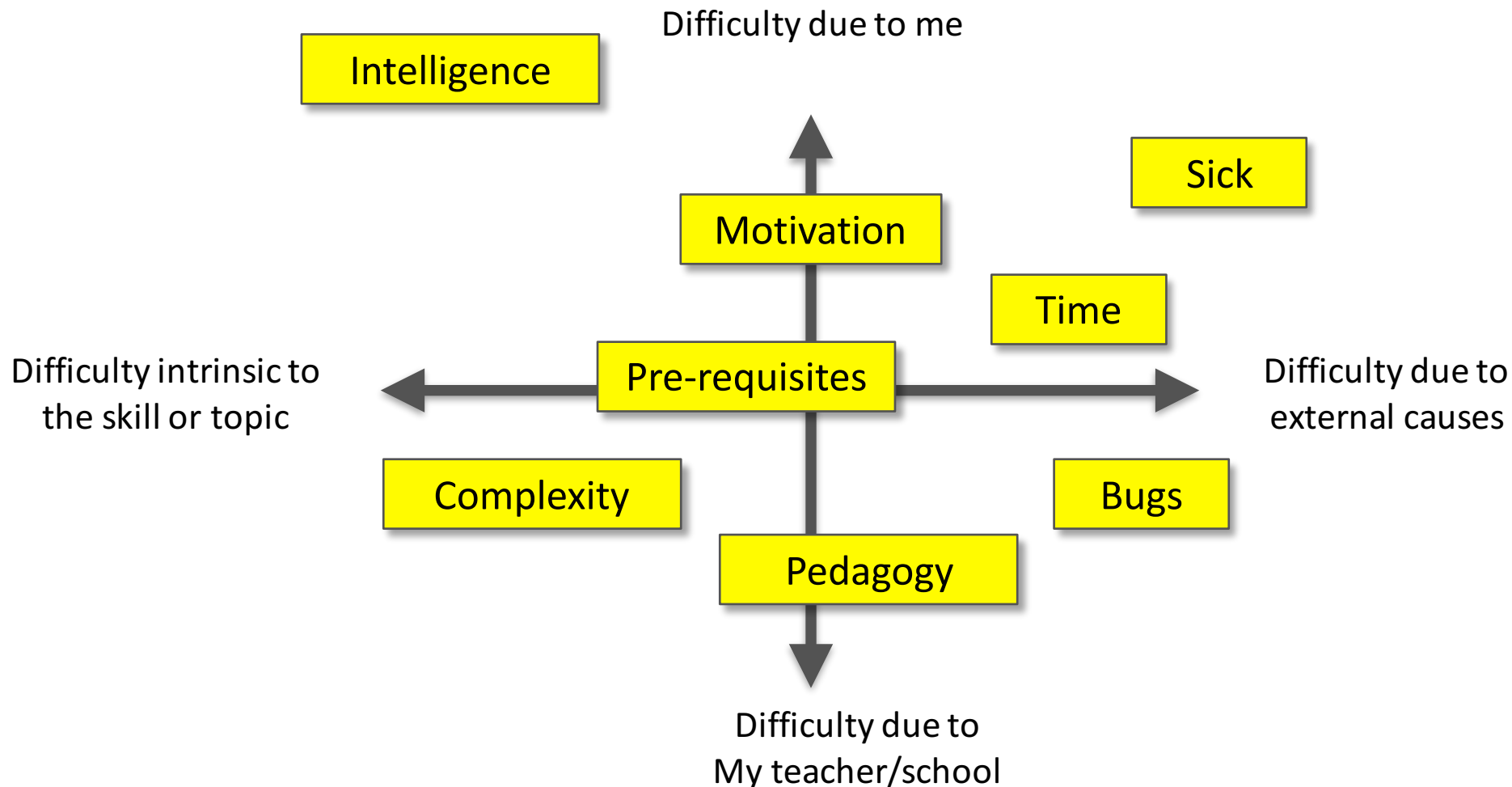
How we help them to learn ? Why helping ?



How do we design activities that make them learn ?

How can digital technologies enhance these activities ?

Why do we need help to learn ?



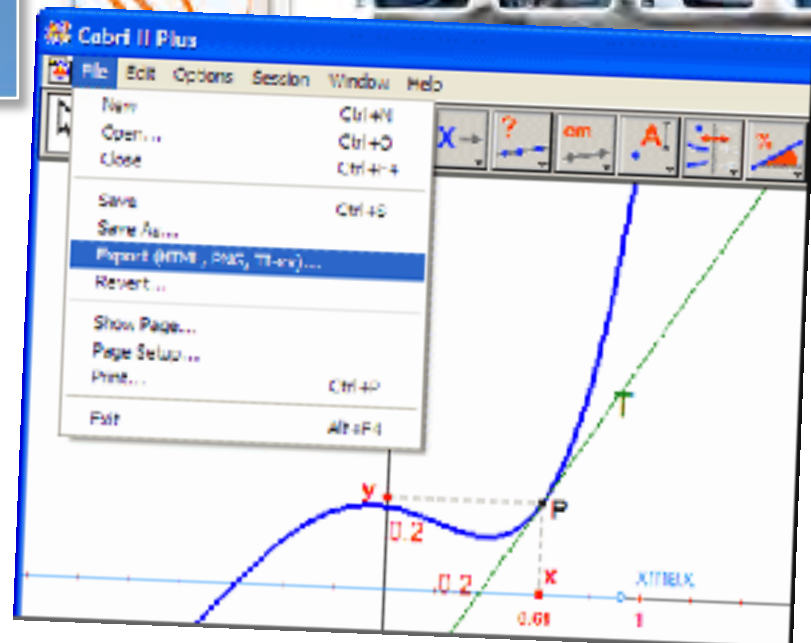
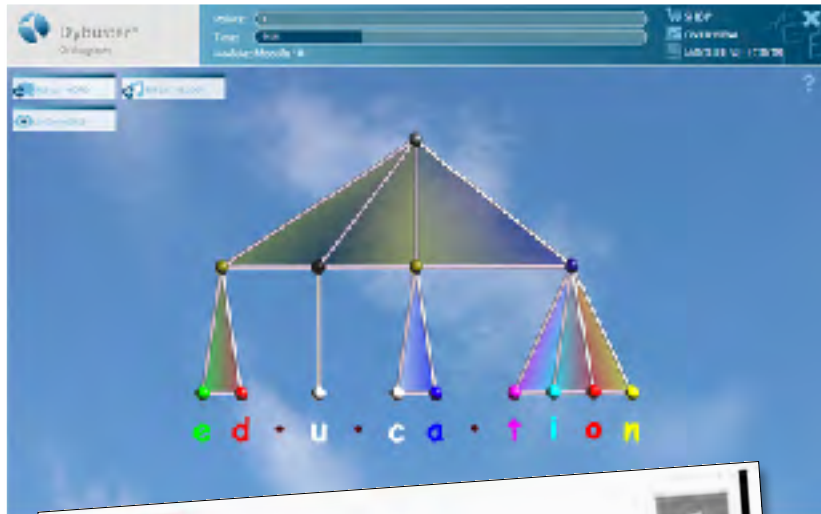
How do people learn ?

How we help them to learn ?

How do we design **activities** that make them learn ?

How digital **technologies** enhance these activities ?

Overview of Learning Technologies





“If, by a miracle of mechanical **ingenuity**, a book could be so arranged that **only** to him who had done what was directed on page one would page two become **visible**, and so on, much that now requires personal instruction could be managed by print. (page 165)”

Thorndike, E.L. (1912, published 1923). *Education: A First Book*. New York: Macmillan Co.

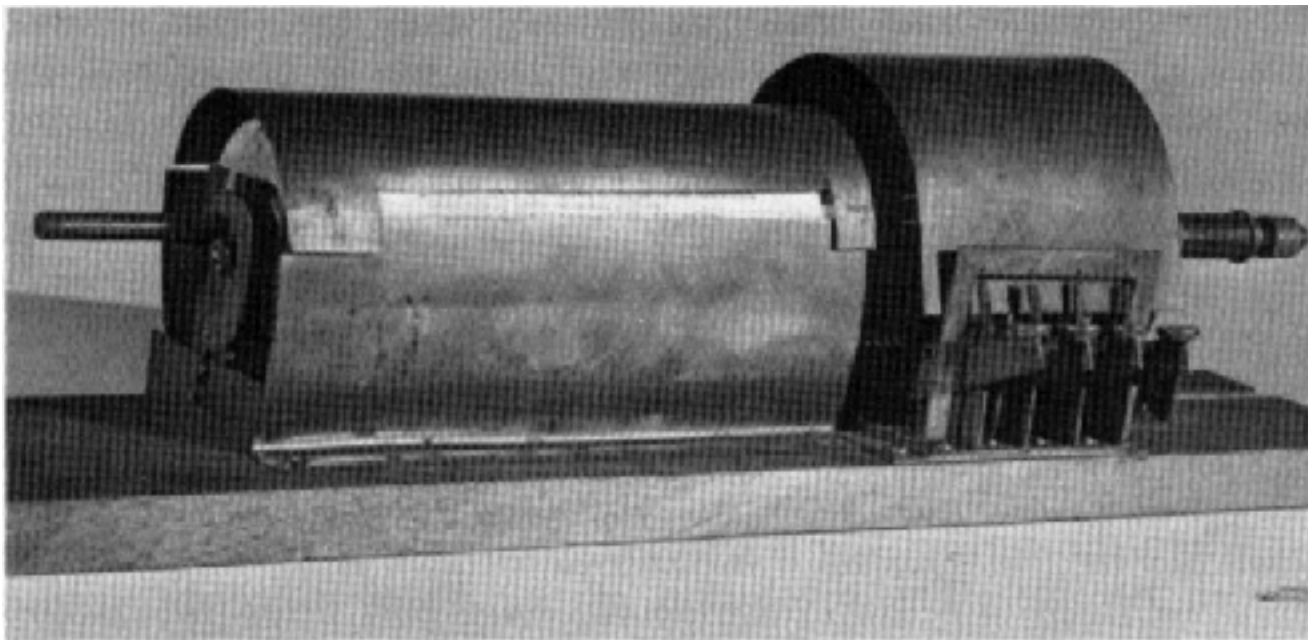


FIG. 1. A multiple-choice device which omits items from further presentation once the student can consistently answer them correctly. 1927

First « teaching machine »

Sidney PRESSEY, Ohio State University

- In some window appears 1 question and 4 answers
- The machine has 4 buttons, one per answer
- The machine records the answer and updates a counter
- Questions correctly answered are not re-proposed

<http://www.coe.uh.edu/courses/cuin6373/idhistory/pressey.html>

Massive Open Online Courses (2008)

Technology-enhanced learning (2004)

Virtual Campus (2000)

Learning Management Systems (1999)

Virtual University (1999)

Open Learning (1995)

e-Learning (1993)

Online Education (1993)

Computer-Mediated Learning (1990)

Educational telematics (1988)

Computer-Assisted Learning (1985)

Computer-Based Learning (1980)

Computer-Assisted Instruction (1960)

DRILL & PRACTICE



Quitter

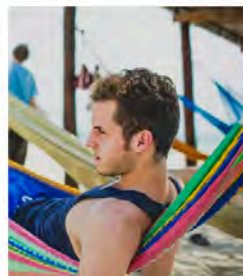


Choisis la traduction de "homme"



☐ apple

1



☐ man

2



☒ woman

3



Solution correcte :

man

[Signaler un problème](#)

Continuer


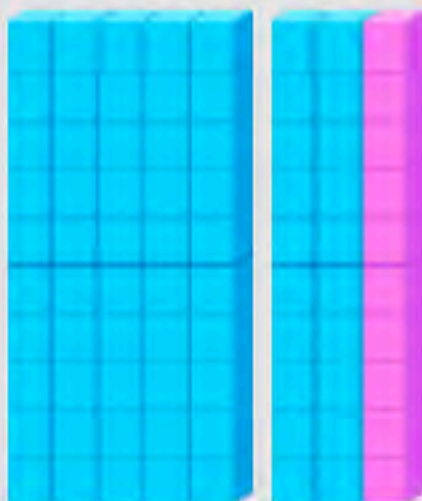
DRILL & PRACTICE



HappyNumbers.com



$$72 + 16 = \boxed{}$$

 Tens Ones

DRILL & PRACTICE



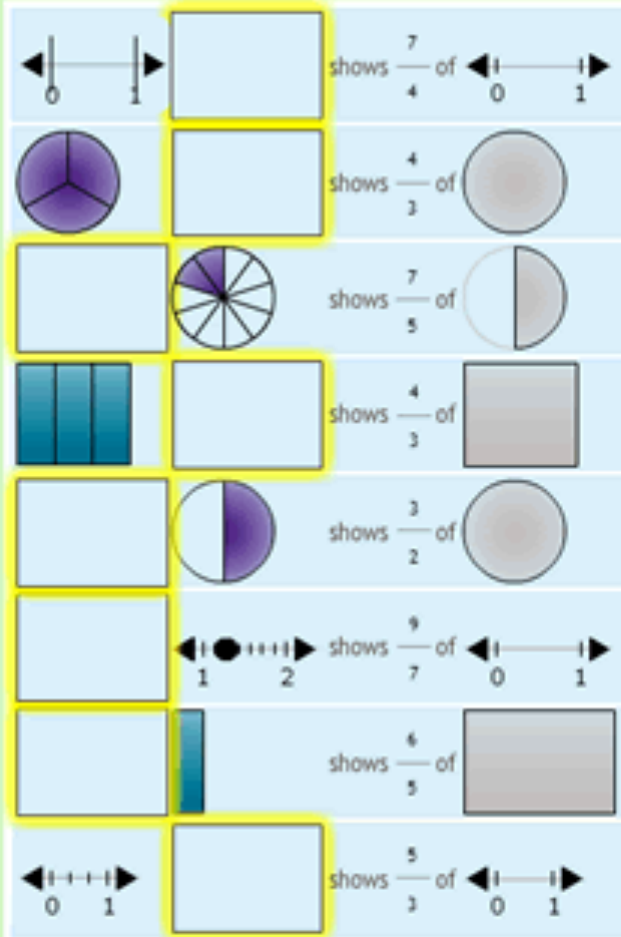
AI-enhanced math tutor

DRILL & PRACTICE

Mixed Representations

Let's look at representations of fractions to sort them!

- 1 The improper fractions on the right are incomplete. Drag and drop each representation below into the correct slot to complete all of the fractions.




?
Hint

Of which fraction is the highlighted circle a part?

← Previous

Button →

Course Menu

- Overview 
- Attitude and behaviour
- Driving techniques
- Driver comfort
- Test

Drivewize Training

Roadworthy vehicles

It is in everyone's interest that vehicles on the road are in a roadworthy condition.

The driver of the vehicle is the person responsible for the vehicle being in a roadworthy condition when in use on public roads. If your car is found not to be roadworthy you will be subject to hefty fines, points on your licence and even having your vehicle scrapped.

Note

Remember, it is an offence to use an unroadworthy vehicle on the road.



7 / 12



e-Learning

Close

**EssentialSkillz**
Compulsive Learning**Course Menu**

Overview

Attitude and behaviour

Driving techniques

► Driver comfort

Test

Drivewise Training**Driving position**

We all mostly have a preferred driving position. Which one of the following best describes your driving position?

Interact

Select a driving position



3 / 10



CommLab for effective learning
I N D I A

Information Security Practices for Employees

Check Your Understanding

11 of 16

Drag and drop the documents to their respective trays based on their TYPE.

Blank Application	Training Material	Passport	Budget Plan	Customer Survey
SOP	Finger Prints	Business Strategies	Client Proposals	Information from Govt.

Confidential	Internal Use	Restricted	Public
--------------	--------------	------------	--------

← SUBMIT

e-Learning



Je circule sur une route prioritaire :

OUI

NON

Je dois obligatoirement mettre le clignotant à droite :

OUI

NON



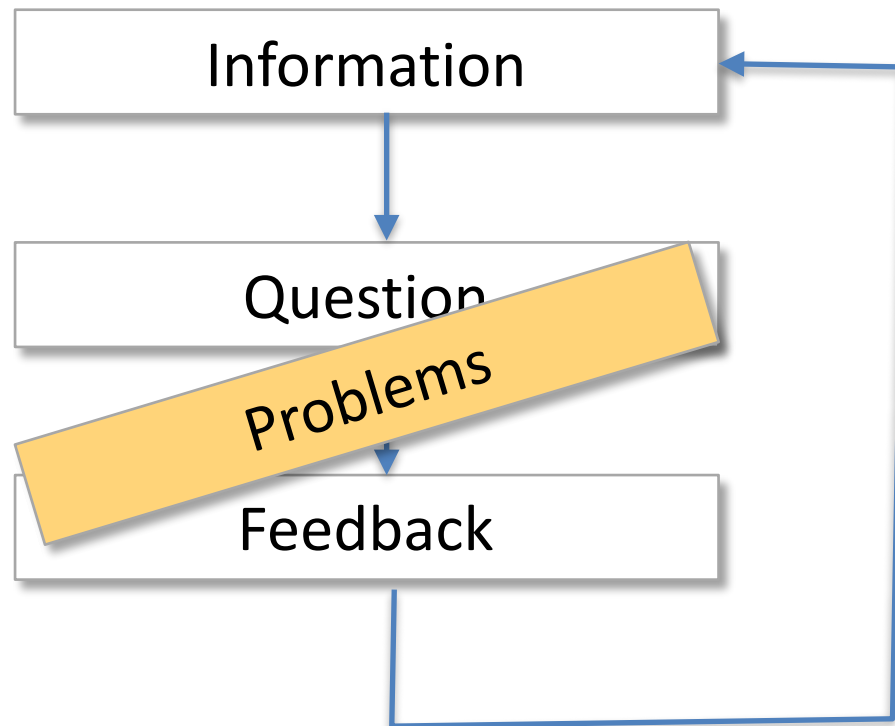
A

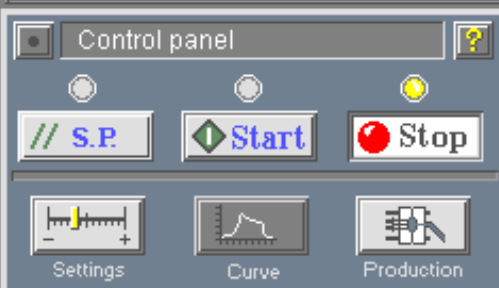
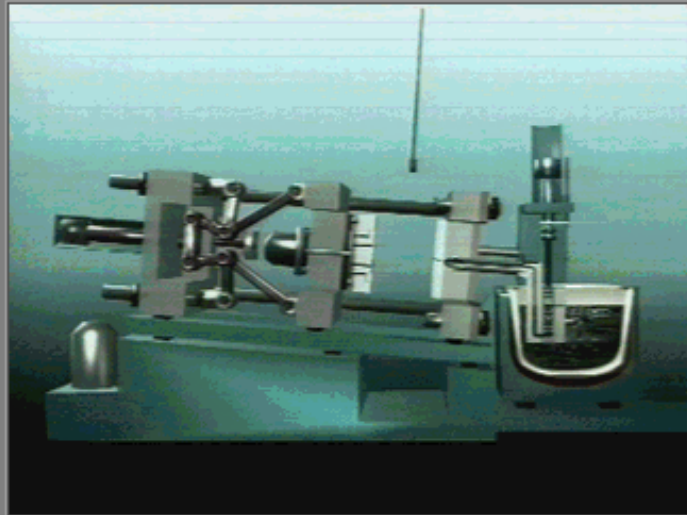
B

C

D

e-Learning





Start machine
making a...

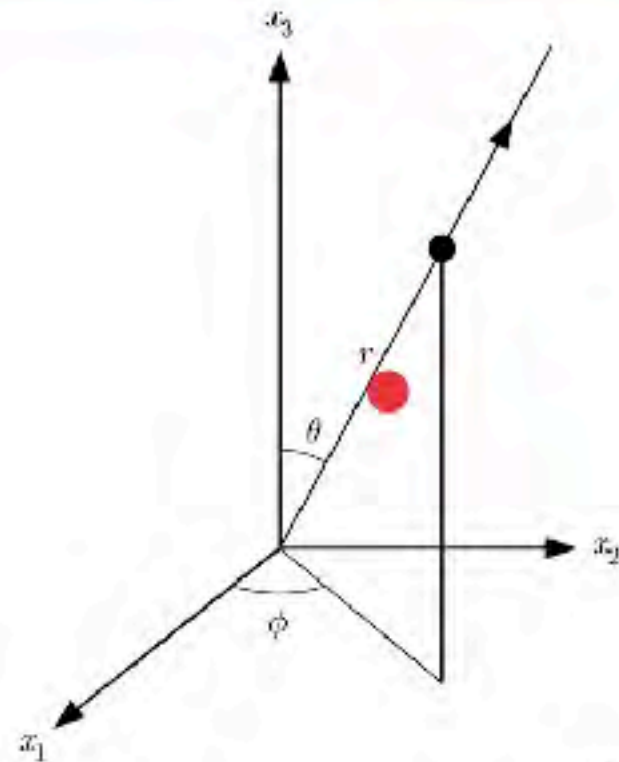
Click on '+' or '-'
to modify the value
of the setting.

Confirm that value by
clicking on 'OK'.



If you would like an indication of the value to enter, click
on the 'Info' button and choose the option 'Indication'.

Définition : lignes de coordonnées (c. sphérique)



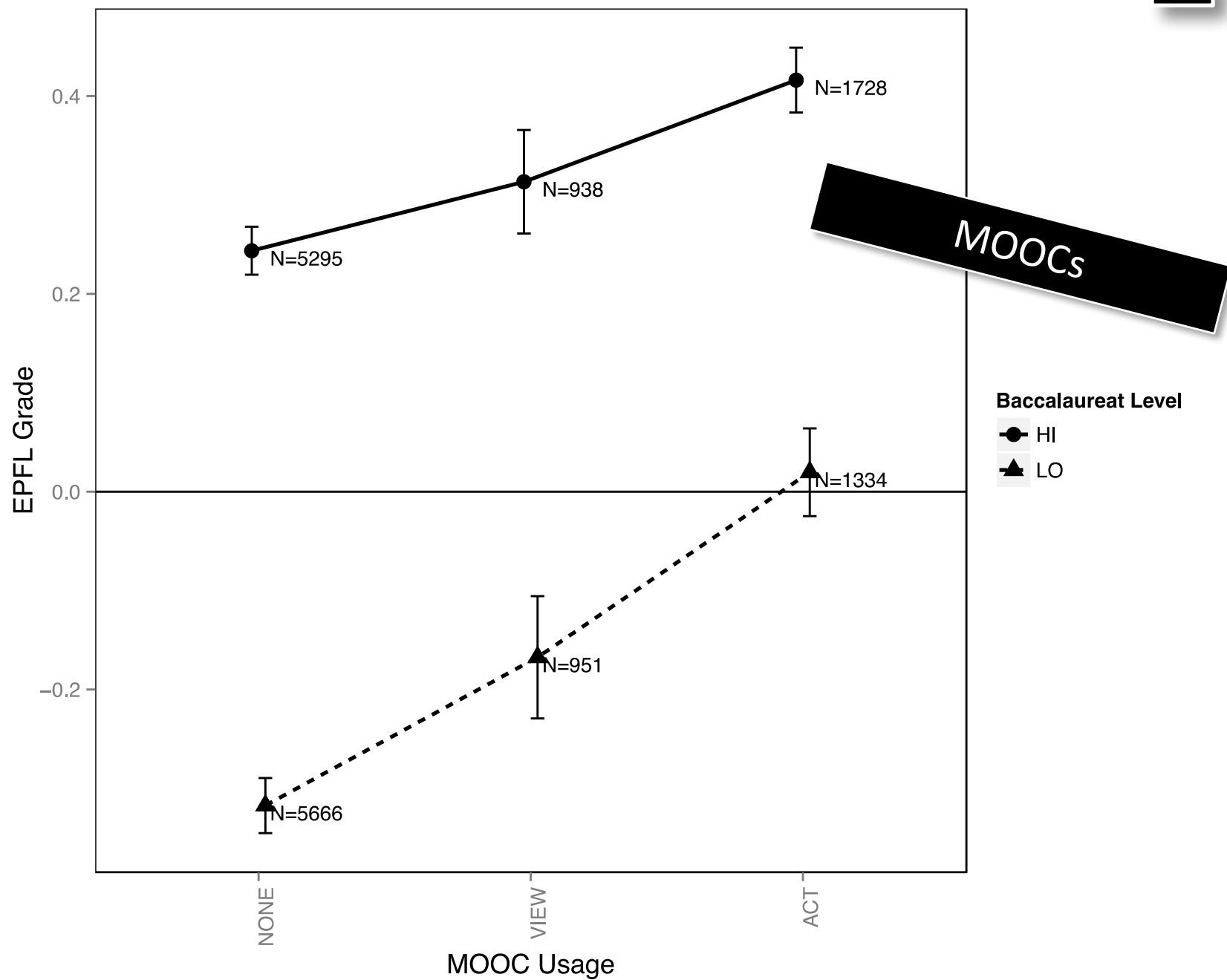
MOOCs



MOOCs

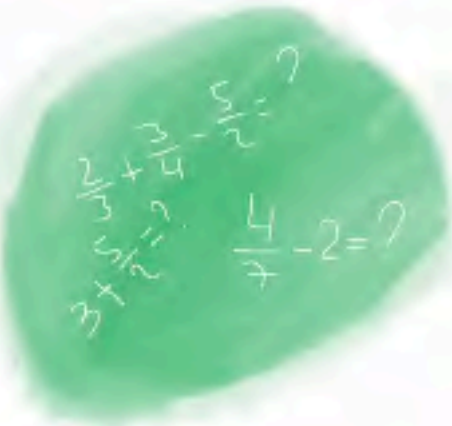
A world map with a light gray background. Numerous red dots of varying sizes are scattered across the map, representing the global distribution of MOOCs. There is a high concentration of dots in North America, Europe, and East Asia, with smaller clusters in South America, Africa, and Australia.

EPFL MOOCs: >2 M



Fractions numériques - Addition

MOOCs

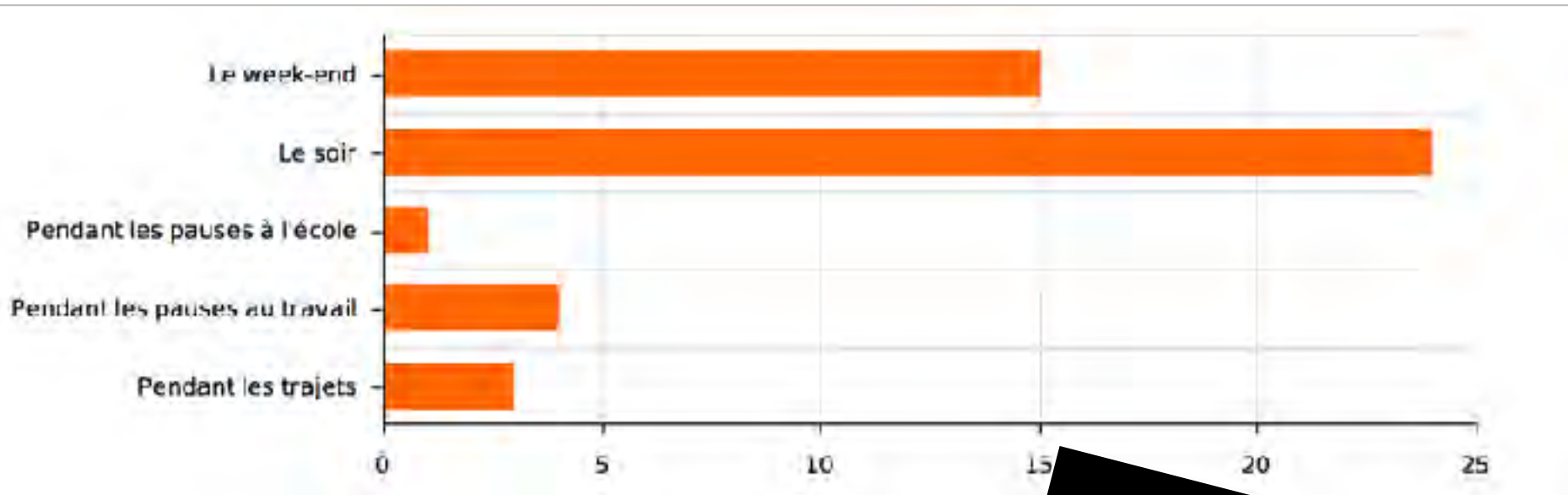


Handwritten math problems on a green chalkboard:

$$\frac{2}{3} + \frac{3}{4} - \frac{5}{2} = ?$$
$$\frac{4}{7} - 2 = ?$$

Thierry Hugonnet, CPNV

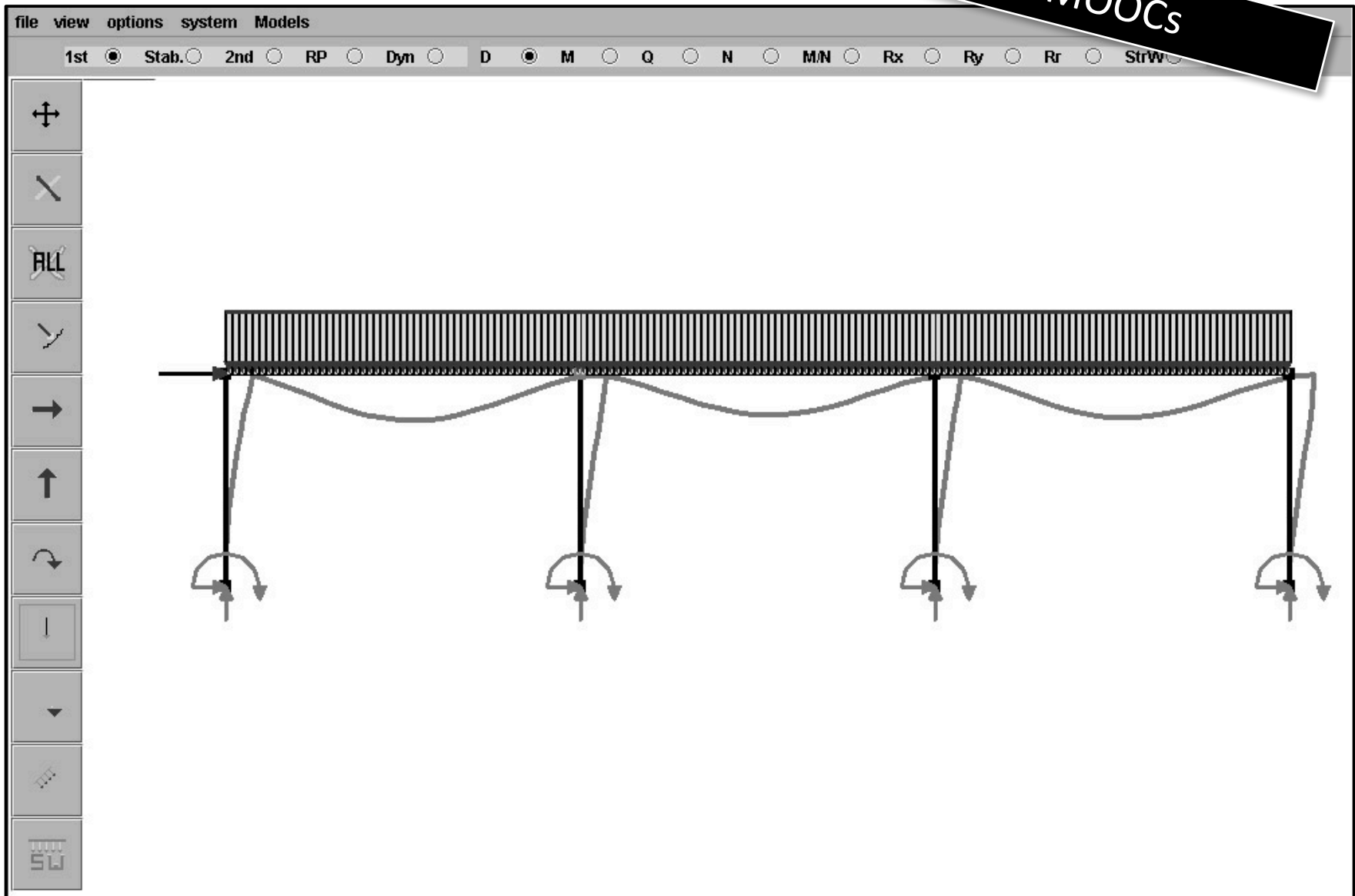
When did you look at your math videos ?



MOOCs

Statics (Muttoni & Burdet)

MOOCs

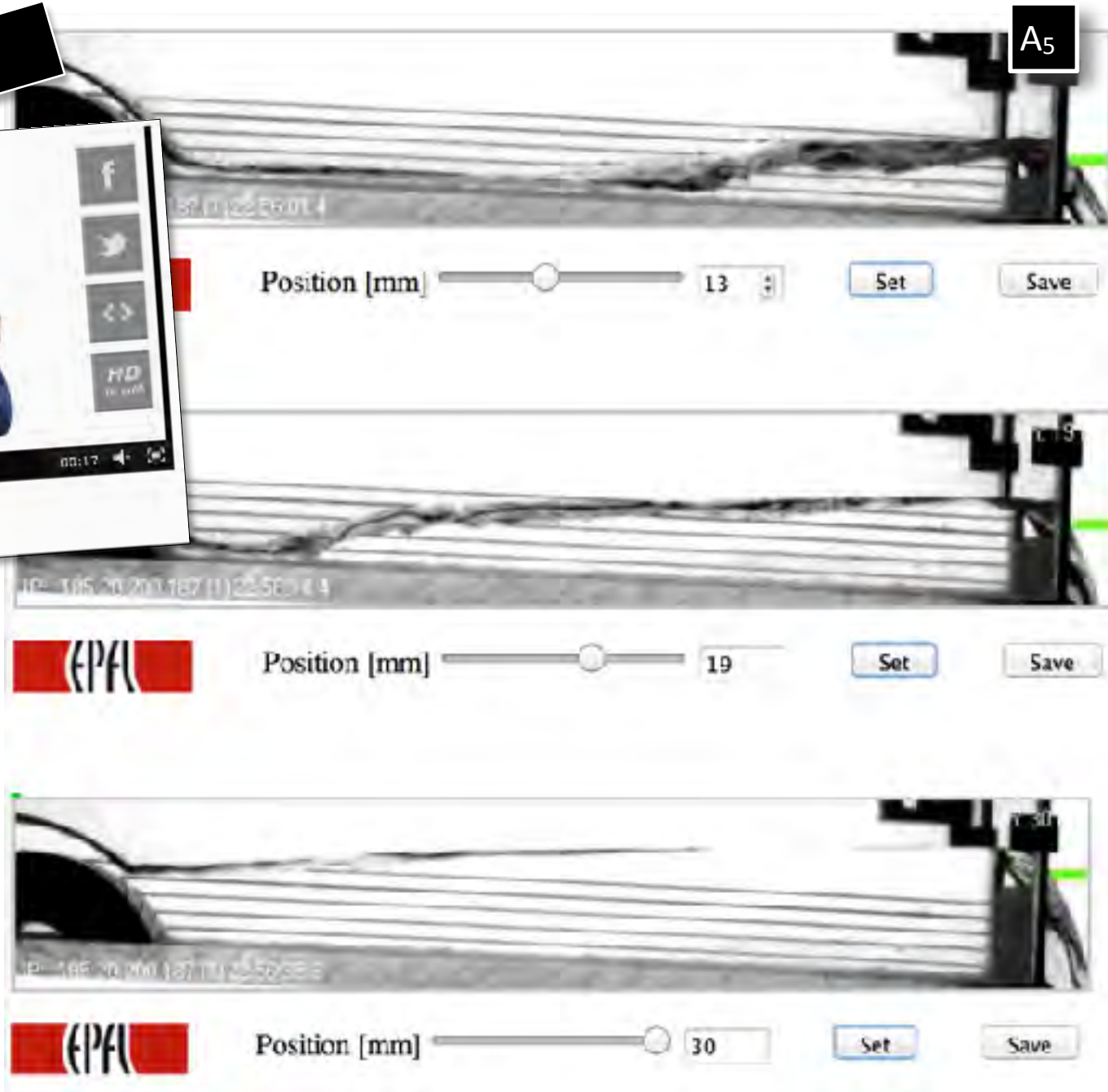


MOOCs

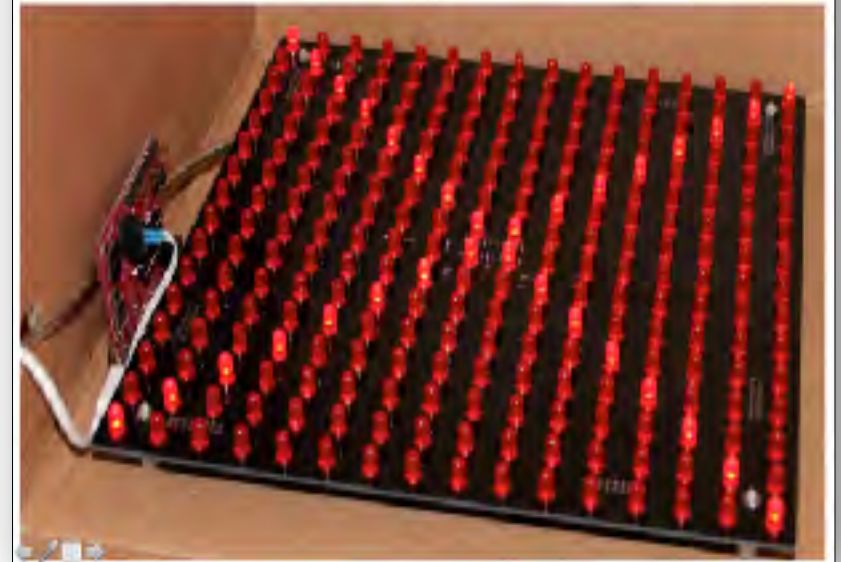
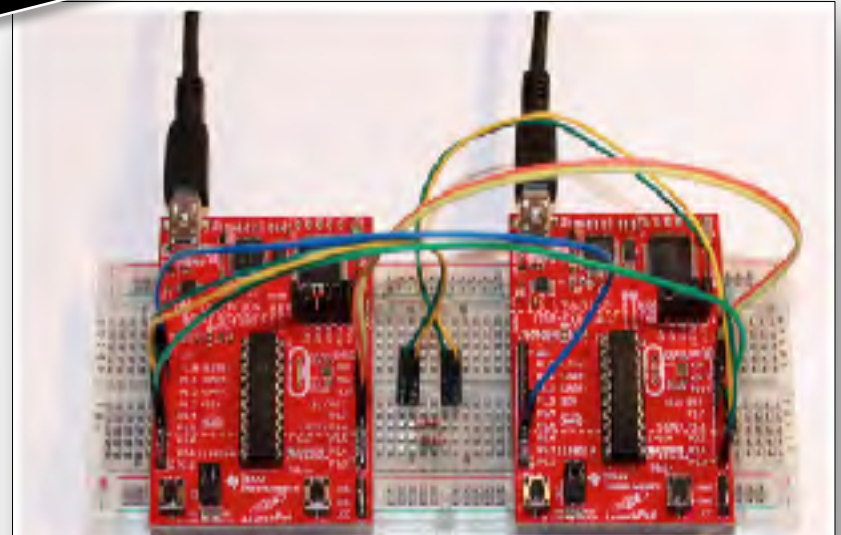
A5



Teaser MOOC de Mécanique des Fluides
G. Ancey, F. Gallaire et M. Rametoli



MOOCs



MOOCs



Welcome.



©Bühler



0:05 / 3:40

▶ SPEED 1.0x



HD

DIALOGUE



EPFLx: MatlabOctaveBeginnersX
MATLAB and Octave for beginners

Cours Discussion Progression Bibliography and internet links Notes

Tous les sujets > Chapter 2, assignments

Ajouter un message

Rechercher tous les m...

Recherche

Show all posts

par activité récente

- Doubt in 2.4.1 7
Hey everybody, I'm trying to solve ...
- Test 2.4 5
I don't want to post answers, but ...
- 2.2.1 12
I have figured out the code but I d...
- Exercise 2.1.6 11
The code to calculate the y coordi...
- Question 2.1.5 4
Hello house: Can anyone help me ...
- Problem on 2.5.2 4
Exercise 2.5.2 Which operation is ...
- Test 2.2.3 1
- 2.2.2 2
I got the answer right on matlab b...

Doubt in 2.4.1

discussion posted 2 years ago by [HugoBerten1995](#)

Hey everybody,

I'm trying to solve the problem 2.4.1. I introduced the matrices A and b like this on MATLAB:

$A = \begin{bmatrix} -8 & 2 & 4 & -5 & -5 & -6 & -2 & 2 & -8 \end{bmatrix}$; $b = \begin{bmatrix} 9 & 10 & -1 \end{bmatrix}$;

I simply calculated b/A to solve the equation, but the result comes in a line vector. Do I take the transpose of c or am I doing something wrong?

Thanks in advance! Have a nice day

Ce message est visible par tous.

Ajouter une réponse

1 réponse

[HugoBerten1995](#)

2 years ago

I've already seen that I need to do A/b , however, when I put the result with only two decimals, they say it's wrong!

You need to show it as: $[x;y;z]$ form is that what you did?

abc

Text



Drawing



Theory



Hypothesis



Law



Claim



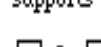
Data



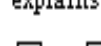
Unspecified



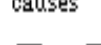
supports



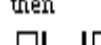
explains



causes



then



conflicts



HIV and AIDS 2

DIALOGUE

Theory

One of the theories that was stated in the dialogue was that the HIV virus really DOES NOT cause AIDS

supports

supports

conflicts

Data

HIV cannot be isolated from 20-50% of AIDS cases.

Data

In the article, it states that the HIV virus violates 3 postulates of Knoch and Henle.

Theory

The other theory stated was that the HIV virus really DOES cause AIDS.

Data

After introduction of the HIV antibody screening test in the US, the transmission of HIV in the blood supply in the US was reduced from 1/1000 to 1/40000.

explains

then

Unspecified

If the HIV virus cannot be detected in almost 50 % of the AIDS cases, then what actually causes the AIDS virus

Data

HIV is in violation with the Knoch's first postulate because it is not possible to

supports

Belvedere

DIALOGUE

A photograph of three young girls sitting at a desk in a computer lab. They are all smiling and clapping their hands. The girl on the left is wearing a red sweater over a white collared shirt. The girl in the middle is also wearing a red sweater over a white collared shirt. The girl on the right is wearing a white collared shirt. They are sitting in front of a computer monitor and mouse. In the background, there are other computer monitors and a large window with a grid pattern. A black banner with the word 'DIALOGUE' in white capital letters is positioned diagonally in the upper right corner of the image. A white box with the text 'M. Nussbaum, UC Chile' is located at the bottom center of the image.

M. Nussbaum, UC Chile

7. Draw Spirals

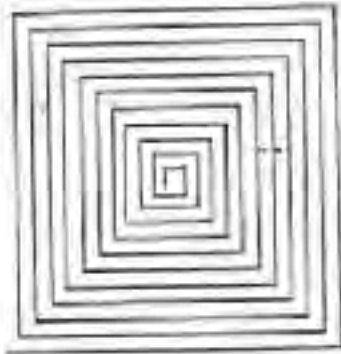
To change the procedure called POLY so as to draw spirals we make a very small addition to line 3. We also change the name -- but that is of course unnecessary.

```
TO POLY :STEP :ANGLE
1 FORWARD :STEP
2 LEFT :ANGLE
3 POLY :STEP :ANGLE
END
```

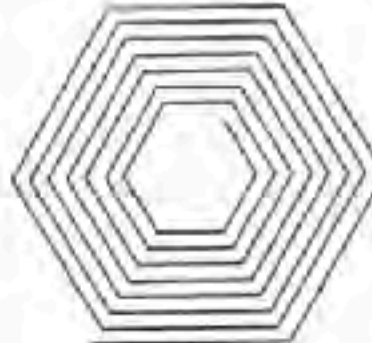
```
TO POLYSPI :STEP :ANGLE
1 FORWARD :STEP
2 LEFT :ANGLE
3 POLYSPI :STEP+5 :ANGLE
END
```

MICROWORLD

POLYSPI 5 90



POLYSPI 40 60



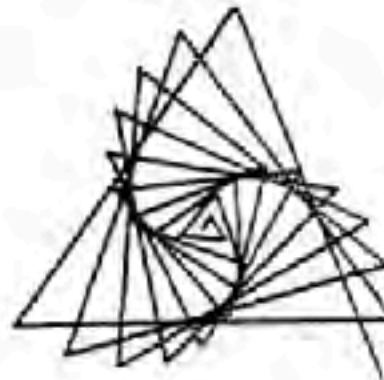
POLYSPI 5 120



POLYSPI 5 121



POLYSPI 5 125





thymio

A5

MICROWORLD



MICROWORLD

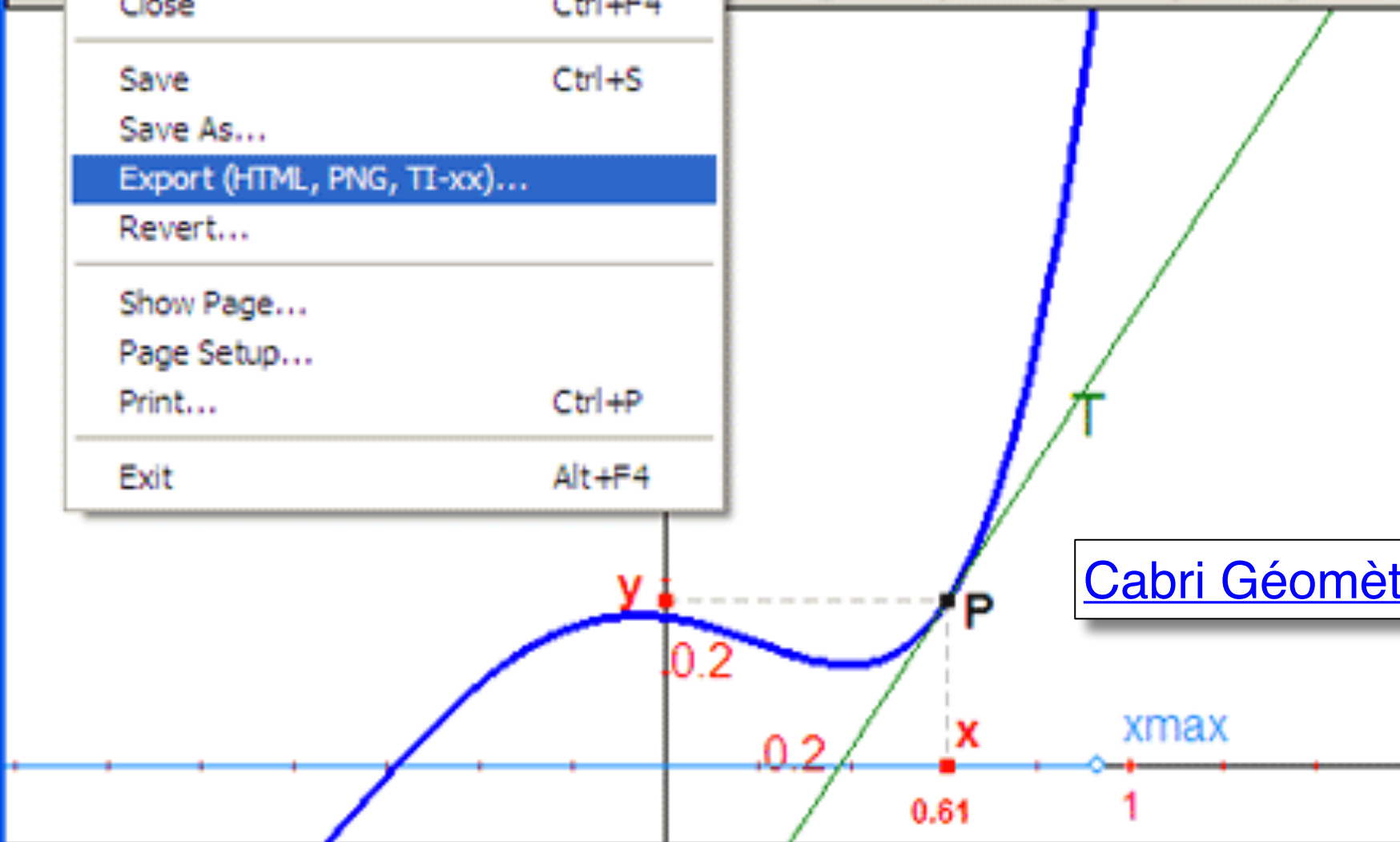


MINECRAFT



MICROWORLD

- New Ctrl+N
- Open... Ctrl+O
- Close Ctrl+F4
- Save Ctrl+S
- Save As...
- Export (HTML, PNG, TI-xx)...
- Revert...
- Show Page...
- Page Setup...
- Print... Ctrl+P
- Exit Alt+F4

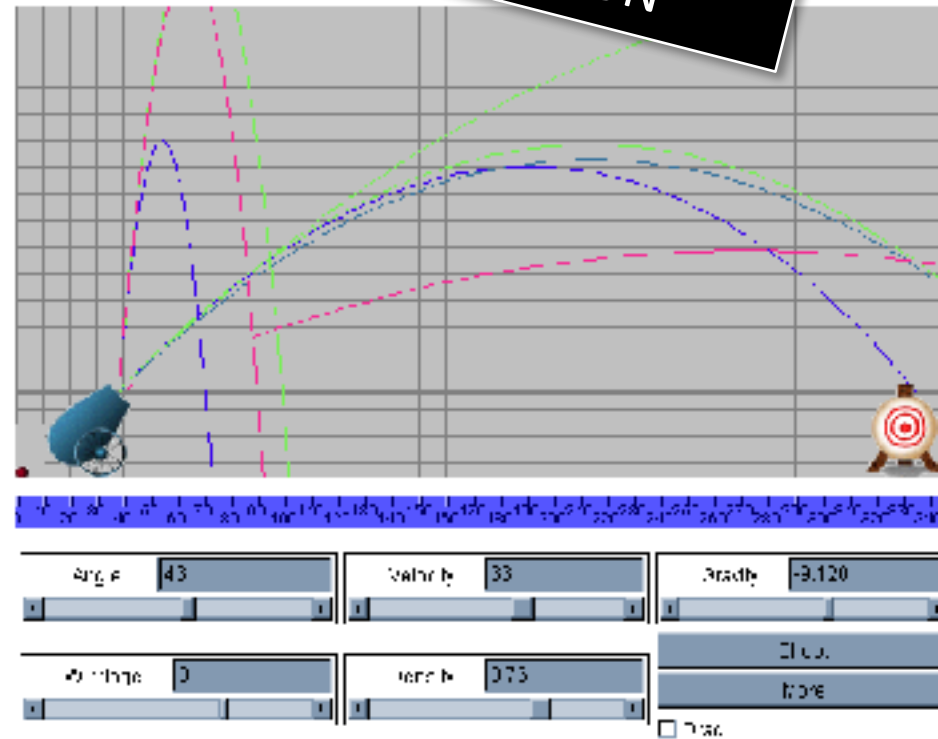


Cabri Géomètre

SIMULATION



Acquire Skills

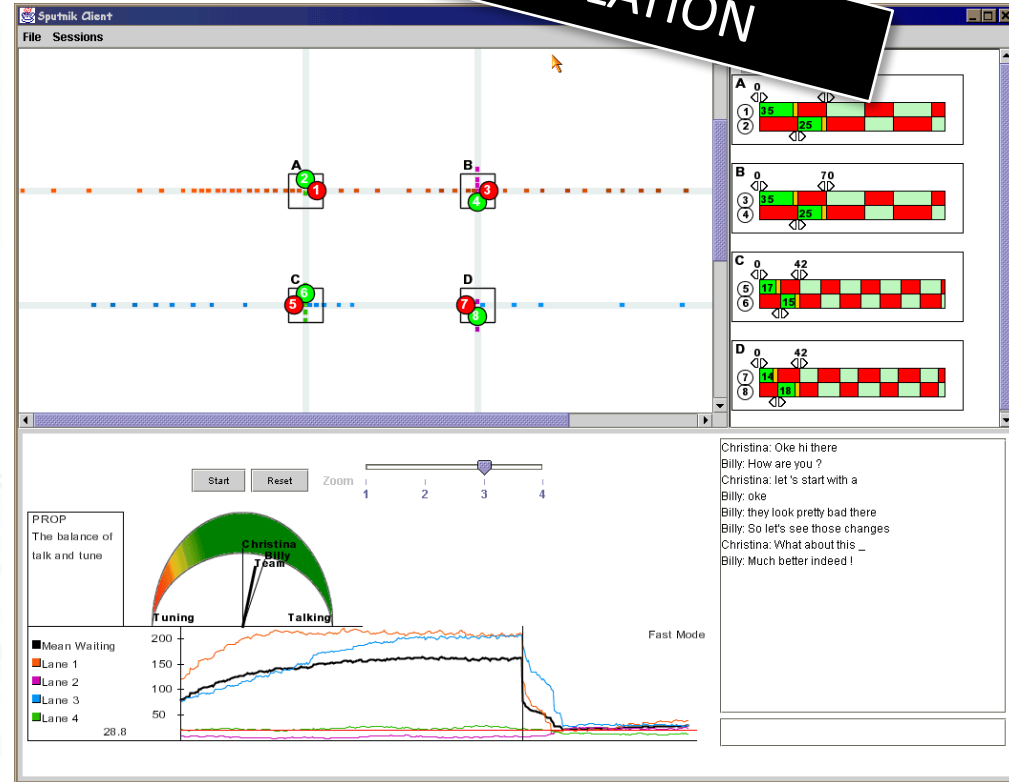


Discover underlying model

SIMULATION



Acquire Skills



Discover underlying model

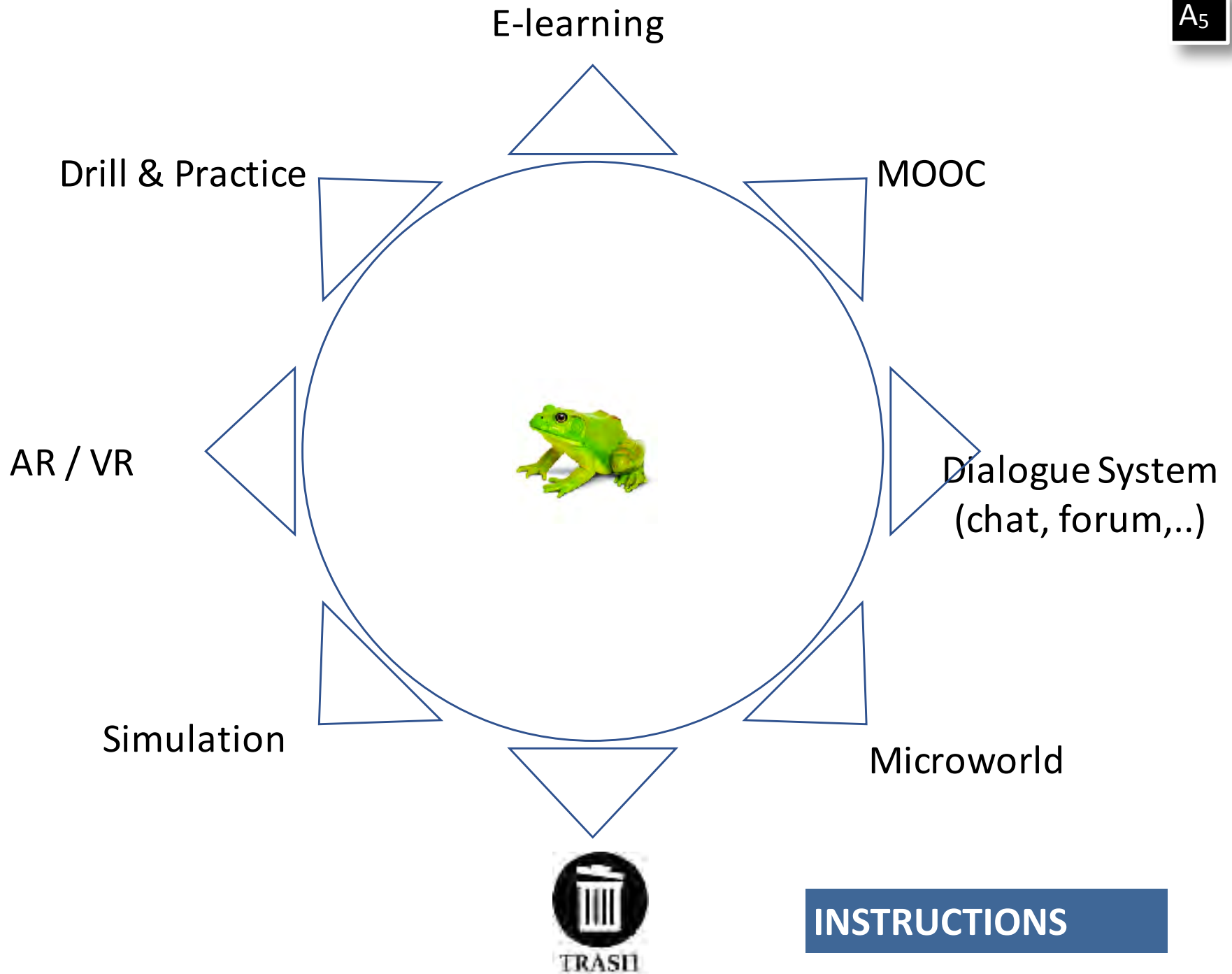
AR/VR

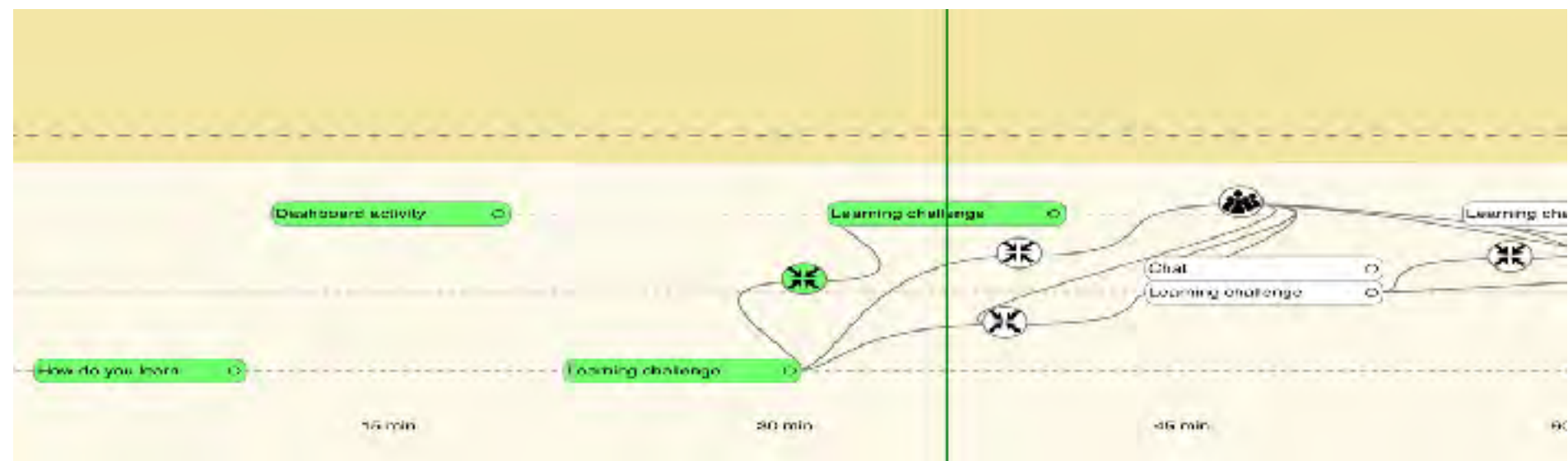


AR/VR

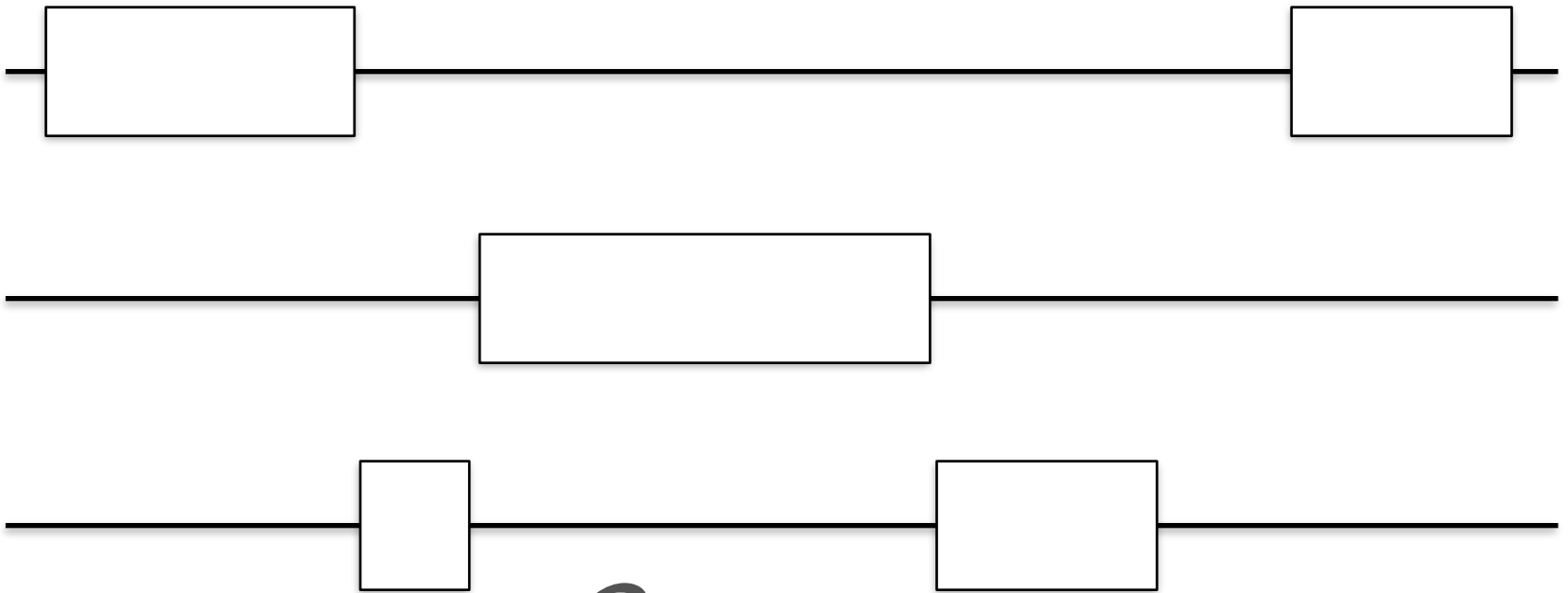


AR/VR





TODAY



Orchestration Graphs



CS 411 Project

1. Make team of 3
2. Pick to topic
3. Decompose it
4. Design an orchestration graph
5. Implement it on FROG
6. Run experiments
7. Analyse data
8. Write a report



Last Year Projects

1. Sorting algorithms
2. Supervised VS Unsupervised learning
3. Shape of letters
4. Modular origami
5. Reading a music partition
6. Chess Moves
7. First Aid
8. Morse Code

08:15

10:15



12:00

Sept

How people learn ?
How technology help ?

Design a learning scenario
(orchestration graph)

Oct

Nov

How to model learners ?
(learning analytics)

How to analyse data

Dec

	08:15 → 10:00 Course	10:15 → 12:00 Project
18/09	CH 1. Introduction to CS-411 (OG-11) CH 2. Introduction to Learning Sciences	Introduction to FROG, S. Haklev Implement Graph-01. → 21.09 Form project teams → 24.09
25/09	CH 3: Mastery Learning (OG13 and 14)	Feedback on Graph-01 S. Haklev, J. Olsen Implement Graph-02. → 28.09 Select project topic → 01.10
02/10	CH 4: Task Analysis	Feedback on Graph-02, S. Haklev, J. Olsen Task analysis
09/10	CH 5: Social Learning (OG15)	Project . S. Haklev, J. Olsen & L. Faucon 11:00 Visit of the MOOC studio (1/2 class)
16/10	CH 6: Discovery Learning (OG16)	Project. S. Haklev, J. Olsen & L. Faucon 11:00 Visit of the MOOC studio (1/2 class)
23/10	CH 7: Graph Edges CH 8: Graph Operators	Project. S. Haklev, J. Olsen & L. Faucon Milestone1: Project Design → 26.10
30/10	CH 8: Designing experiments	Project . S. Haklev, J. Olsen & L. Faucon
06/11	CH 9: Learning Modelling <i>Running Experiments</i>	Introduction to statistics (R & Jupiter Notebook) <i>P. Jermann, L. Faucon</i>
13/11	CH 10: Bayesian Knowledge Tracing J. Olsen <i>Running Experiments</i>	Introduction to statistics (R & Jupiter Notebook) <i>P. Jermann, L. Faucon</i>
20/11	CH 11: Advances in learning Analytics J. Olsen & P. Dillenbourg <i>Running Experiments</i>	Introduction to statistics (R & Jupiter Notebook) <i>P. Jermann, L. Faucon</i>
27/11	CH 12: Campus Analytics, <i>P. Jermann</i> <i>Running Experiments</i>	Data Analysis <i>P. Jermann, L. Faucon</i>
04/12	CH13: Corporate Learning <i>08:15 P. Dubuc, OpenClassrooms</i> <i>09:00 J.-M. Tassetto, CoopAcademy.</i>	Data Analysis <i>P. Jermann, L. Faucon</i>
11/12	<i>Open Slot</i>	Data Analysis <i>P. Jermann, L. Faucon</i>
18/12	Project presentation by each team	Finalising report

Confusion

Ed'Tech
Methods & Tools

1

2

Digital **Skills**
Goals

Data Sciences
of educational

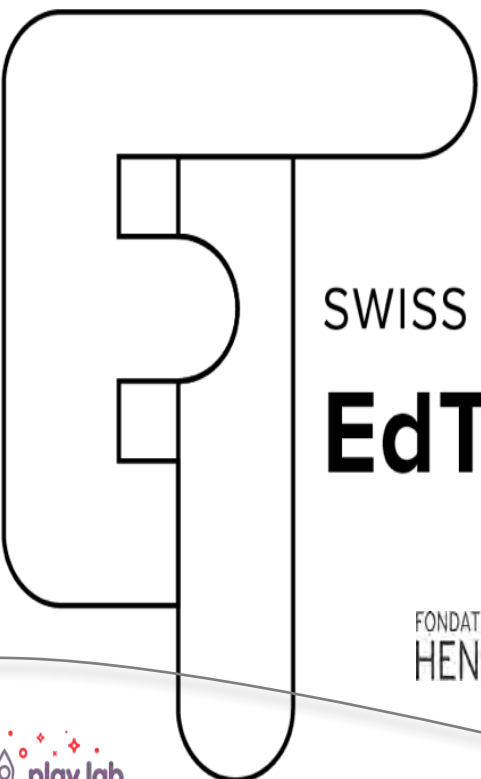
3

for the governance
systems

EPFL
Innovation Park



digitalswitzerland



SWISS



swisscom



ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE



CVCI
CHAMBRE VAUDOISE
DU COMMERCE ET
DE L'INDUSTRIE

EdTech Collider

FONDATION
HENRIMOSER

JACOBS
FOUNDATION
Our Promise to Youth

A7



TOTALYIMAGE



we are play lab



Dybuster



coopacademy



Klewel
the webcasting company



GOODWALL



NEOCOSMO



PocketCampus



Calerga



better study



EKSTRA
REALITY



LANTERNA
solutions



MAT RIX



mobsya



headswap



bulbee
Swipe to learn.



GRAASP



Si



IDEO



tthf
media



Happy
Numbers



educabay
Key to unlimited academic knowledge



UbiSim



MOBILE TIC



taskbase



Rosie



LABSTER



lillup
lead your life



Simpliquity



Test
We.



SLX
Swiss Learning Exchange



ayaru



Little Vista



LEDsafari



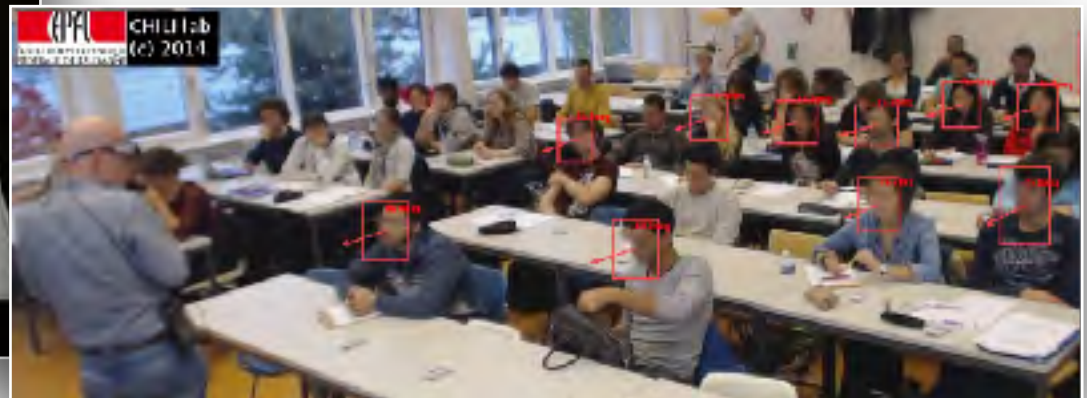
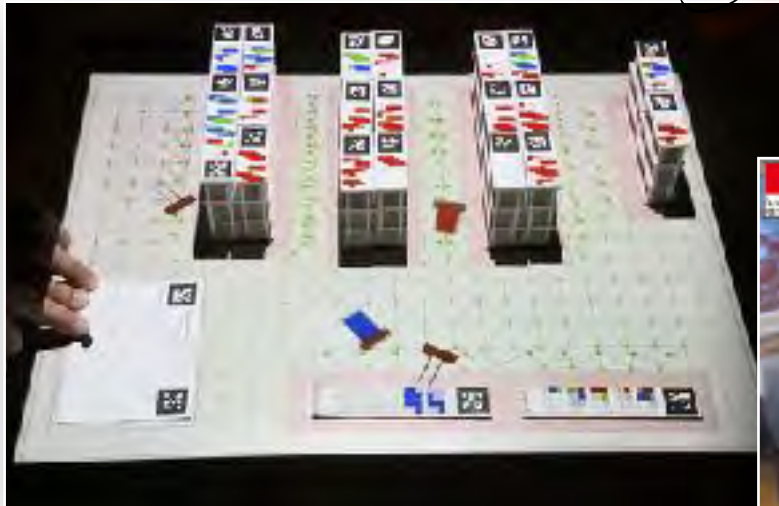
A world map with red data points plotted across various continents. A label 'Headquarter' with a Swiss flag icon points to a cluster of points in Europe.

Headquarter

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EPFL Center for Learning Sciences



Who has taken a ML class ?

Who is taking a ML class ?

1

1

4

CS



Project (50%)

Form teams of 3

No the same team as ever

One team member knows javascript

Choose a topic in which one of you is expert

Exam (50%)

Oral: 15 min prep + 15 defense (with notes)

Applied questions