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

Lecture: 5%
Reading: 10%
Audio Visual: 20%
Demonstration: 30%
Discussion Group: 50%
Practice by Doing: 75%
Teach Others: 90%

Average Retention Rates after 24 hours

Source: National Training Laboratories, Bethel Maine
HOW PEOPLE LEARN depends also upon WHAT PEOPLE LEARN

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

How do 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?

Difficulty due to me

- Intelligence

Pre-requisites

- Motivation
- Complexity
- Pedagogy

Difficulty intrinsic to the skill or topic

- Pre-requisites

Difficulty due to external causes

- Bugs
- Time
- Sick

Difficulty due to My teacher/school
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)"

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)
Virtual Campus (2000)
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)
Choisis la traduction de "homme"

Solution correcte :
man
72 + 16 =
DRILL & PRACTICE

https://vimeo.com/251725552
AI-enhanced math tutor

https://mathtutor.web.cmu.edu/alternate
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.

https://www.essentialskillz.com/online-training/health-and-safety/driver-training-uk
e-Learning

https://www.essentialskillz.com/online-training/health-and-safety/driver-training-uk
https://blog.commlabindia.com/elearning-design/awareness-on-information-security
Je circule sur une route prioritaire :
OUI
NON

Je dois obligatoirement mettre le clignotant à droite :
OUI
NON
Le Zinc, UTE- UMH, Belgium, C. Depover
Définition: lignes de coordonnées (c. sphériques)
MOOCs
EPFL MOOCs: >2 M
MOOCs

Baccalaureate Level
- HI
- LO

MOOC Usage

EPFL Grade

N=5295
N=938
N=1728
N=951
N=1334
N=5666
Thierry Hugonnet, CPNV
When did you look at your math videos?
Statics (Muttoni & Burdet)
Welcome.
Doubt in 2.4.1

Discussion posted 2 years ago by HugoBetten1995

Hey everybody,

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

\[
A = \begin{pmatrix} -8 & 2 & 4 & 5 & 6 & -2 & 8 \\ 9 & 10 & -1 \\ \end{pmatrix}, \\
b = \begin{pmatrix} 9 \\ -10 \\ 1 \\ \end{pmatrix}
\]

I simply calculated bA 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.

---

Exercise 2.1.6

The code to calculate they coordi...

---

Question 2.1.5

Hello house. Can anyone help me ....

---

Problem on 2.5.2

Exercise 2.5.2 Which operation is ....

---

Test 2.2.3

---

2.2.2.

I got the answer right on matlab b....
One of the theories that was stated in the dialogue was that the HIV virus really **DOES NOT** cause AIDS.

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

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

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

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

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

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.
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.

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

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

```
POLYSPI 5 90
```

```
POLYSPI 40 60
```

```
POLYSPI 5 120
```

```
POLYSPI 5 121
```

```
POLYSPI 6 125
```

Acquire Skills

Discover underlying model
Acquire Skills

Discover underlying model
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
How people learn?
How technology help?

Design a learning scenario
(orchestration graph)

How to model learners?
(learning analytics)

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

- **Course** topics are indicated in blue.
- **Project** topics are indicated in green.
- Dates and times are in standard form.
- Electronic components are marked with "Running Experiments."
Confusion

1. Ed’Tech Methods & Tools
2. Digital Skills Goals
3. Data Sciences of educational systems for the governance of educational systems
EPFL Center for Learning Sciences
Who has taken a ML class?

Who is taking a ML class?
**CS 411**

- **Project (50%)**
  - Choose a topic in which one of you is expert
  - One team member knows javascript
  - Form teams of 3
  - No the same team as ever

- **Exam (50%)**
  - Oral: 15 min prep + 15 defense (with notes)
  - Applied questions

---