Chapter 1: Introduction

Pierre Dillenbourg, Patrick Jermann, Thanasis Hadzilakos & Stian Haklev
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)
Learning theory ➔ Learning Technology

1. Behaviorism ➔ Adaptive Instruction
2. Constructivism ➔ simulations, microworlds
3. Social cognition ➔ groupware, communication
“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, Professeur de psychologie de l’éducation, 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
FIG. II. Student at work in the self-instruction room. Material appears in the left-hand window. The student writes his response on a strip of paper exposed at the right.
9 \times 5 = 45
6 \times 7 = 42
6 \times 7 = 44
6 \times 7 = 42

Massive Open Online Courses (MOOCs)
Learning Management Systems (LMS)
Virtual Campus (VC)
Virtual Learning Environment (VLE)
Technological Enhanced Learning (TEL)
Computer-Assisted Instruction (CAI)
Computer-Assisted Learning (CAL)
Computer-Mediated Learning (CML)
Online Education (OE)
e-Learning (e-L)
Open Learning (OL)
Virtual University (VU)
Learning Management Systems (LMS)
Choisis la traduction de "homme"

Solution correcte :
man

Continue

38 millions users
App of the year 2013 Apple
Top of the top App Android 2013

https://www.duolingo.com/skill/en/Basics-1/1
Learning theory ➔ Learning Technology

*How people learn* ➔ *How technology supports learning*

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Stages of development

Jean Piaget

Sensori-motor
(0-2 years)

- Schema created by child reinforcing that objects are permanent
- Understanding of world developed through sensory and physical experimentation

Pre-operational
(2-7 years)

- Beginnings of language through understanding of symbols
- Egocentric
- Difficulty understanding conversation or more than one aspect of a situation

Concrete Operational
(7-11 years)

- Ordering and classifying based on appearance
- Ability to sequence numbers
- Developing ability to empathise
- Simplistic understanding of maths, geometry and physics

Formal Operations
(11+ years)

- Ability to draw conclusions based on hypotheses rather than objects
- Adolescent egocentrism
- Logical

Permanence of object

Conservation Task

PryamidTask
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
```

POLYSPI 5 90

POLYSPI 5 120

POLYSPI 40 60

POLYSPI 5 121

POLYSPI 5 125

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Papert, S. & Solomon, C. (1971, Twenty things to do with a computer, AI Memo 248, MIT)
Cabri Géomètre
THYMIO

https://aseba.wikidot.com/fr:thymiovpl

https://www.youtube.com/watch?v=8RiEDT8bsOs
Acquire Skills

Discover underlying model

Simulations
**Domains**

- Physics
- Mecanics
- Biology
- Economy
- Politics
- Psychology
- ...

*TIDAL™* software package simulates the hydrodynamics and water quality behavior of *large scale water bodies* such as bays, estuaries, rivers, lakes and coastal waters. It incorporates the effects of a number of important physical processes on the water body; these include currents, tides, winds, gravitational and coriolis forces, bathymetry, friction, sources and sinks, and chemical reactions.
Relevance: manipulate and understand phenomena that are

- Too dangerous
- Too small or too large
- Hidden (e.g. inside engine)
- Too slow
- Too fast
- Too rare
- Too complex (⇒ simplification)
- ...
Learning theory ➔ Learning Technology

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Internalisation:
Thinking as a dialogue with oneself

SocioCultural Theories

Social Speech

Inner Speech

Private Speech (Vygotsky)
Egocentric Speech (Piaget)
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.
Multi Input Devices
Multiple Sclerosis News

Select article from list below.

Page 1 of 6.

1 · 2 · 3 · 4 · 5 · 6

Emotional response to music can reduce pain, suggests Montreal study
Jan. 13, 2005

Risks medical receives approval for key multiple sclerosis trial in Britain
Dec. 10, 2004

Take control of your health. Subscribe to Multiple Sclerosis Monthly Newsletter for FREE!

FDA approves new drug to treat multiple sclerosis
Nov. 24, 2004

Popular MS drug may lack evidence
Nov. 22, 2004

Jury begins deliberations in three-week assisted suicide trial
Nov. 3, 2004

Medical users spinning new batch of 'stronger' Health Canada marijuana
Jul. 12, 2004

U.S. Medicare lottery favours some, others must wait until 2005
Jun. 25, 2004

Bayer bids to market marijuana-based multiple sclerosis treatment in Canada
May 11, 2004

Alberta Tories, families, question adequacy of $355 monthly disabled income
May 5, 2004

Researchers set out to identify triggers for multiple sclerosis
May 5, 2004

Nearly a third of legal marijuana users reject government pot
Apr. 29, 2004

Sick kids researchers show strong association between MS, Apr. 20, 2004

Online Communities
Orchestration Graph
Bayesian Knowledge Tracing

Corbett, Anderson, Aleven, Koedinger, .....

\[ p(K_{t+1} \mid B_{t+1}, K_t) \]

\[ p(K_t = 'skill-x' \mid B_t = 'correct answer') = 1 - \text{Guess} \]
\[ p(K_t = 'skill-X' \mid B_t = 'incorrect answer') = 0 + \text{Slip} \]
\[ p(K_t = 'understand-X' \mid B_t = 'nods') = \text{not much} \]
Design Project (20%)
• Design an orchestration graph (teams of 2)

Data Project (30%)
• Learning Analytics Report (teams of 2)
• Kaggle Competition on last day

Exam (50%)
• Oral: 15 min prep + 15 defense (with notes)
• Applied questions
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| 20/09   | 08:15 → 10:00 | **CH1. Course overview**  
**CH2. Orchestration graphs** | Extracting the OG from 3 scenarios described in a narrative format.          |
|         | 10:15 → 12:00 |                                                                            |                                                                             |
| 27/09   |          | **CH3: Graph edge labels**  
**CH4: From behaviourism to mastery learning** | Designing a graph to be uploaded on Moodle as a pdf by Thursday midnight.    |
| 04/10   |          | Review of uploaded graphs  
**CH 5: From Piaget to Augmented reality** | Designing a graph to be uploaded on Moodle as a pdf by Thursday midnight.    |
| 11/10   |          | Review of uploaded graphs  
**CH 6: From Vygostky to Social Networks** | Designing a graph to be uploaded on Moodle as a pdf by Thursday midnight.    |
| 18/10*  |          | Review of uploaded graphs  
**All you need to know about MOOCs**  
(Patrick Jermann)  
**Mapping MOOCs to Orchestration Graphs (Stian Haklev)** | Introduction to R (Patrick Jermann)                                         |
| 25/10   |          | **Models and methods in instructional design (Thanasis)** | Introduction to R (Patrick Jermann)                                         |
| 01/11   |          | Measuring learning | Introduction to R (Patrick Jermann) | **M1: Deliver an orchestration graph**                                        |
| 08/11   |          | **Learning Analytics**  
**M1: Feedback on M1**  
**Pierre Dubuc, Open Classrooms** | Presentation of the data set                                                |
| 15/11*  |          | **Eye Tracking: principles and methods** | Eye tracking experiment                                                       |
| 22/11   |          | Learning Analytics  
**Jean-Marc Tasseto, CoorpAcademy** | Project                                                                      |
<p>| 29/11   |          | Learning Analytics | Project                                                                      |
| 06/12   |          | Learning Analytics | Visit and testing of the MOOC studios                                       |
| 13/12   |          | Classroom Modelling | Project                                                                      |
| 20/12   |          | Synthesis |                                                                 |</p>
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