Multimedia-Based Learning Environments

(Multimediale Lehr- und Lernumgebungen)

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Organisational Remarks

- ***Lecture:*** Prof. Heinrich Hußmann,
  Institut für Informatik

- ***Tutorials:*** Maria Fysaraki
  Ph.D. student in Educational Psychology

- Working language is ***English!***

- Target audience: Students in **Master** programs
  Medieninformatik / Informatik

  – 6 ECTS credits (Vertiefende Themen / Wahlpflicht)

  – "Vertiefendes Thema" für Master-Studierende Medieninformatik und Informatik

  – ***Not*** accountable within Bachelor studies!

- Formal requirements for credits:

  – ***Either:*** Written exam at end of term

  – ***Or:*** Full participation in study-style tutorials (see next slide)

Two Types of Tutorials

- Standard style:
  - Seven groups, meeting weekly
  - Traditional style, (hopefully) higher degree of interactivity
  - Some tutors are from Educational Psychology
  - Written exam (Klausur) at end of term
- Study style:
  - Three groups
  - **Compulsory participation** in four highly interactive sessions on group collaboration, plus preparation meeting
  - Group sessions are used as user studies for research purposes
  - Credit points are earned **without writing the exam!**

E-Learning: Warm-Up

- Let's have a look at the offers at our university!

E-Learning

LMU

**LUDWIG-
MAXIMILIANS-
UNIVERSITÄT
MÜNCHEN**

Learning Management System "Moodle" (at LMU)

Online Access to Audio/Video Recordings (LMU)

"Unterrichtsmitschau 2.0" (LMU)

http://videoonline.edu.lmu.de/

CASUS: Case-Based Multimedia Learning and Authoring System (LMU)

Notarzteinsatz - Patientin mit hohem Fieber

Jump to: ▲ Card Top ❓ Question ✏ Answer

2 of 20 Cards

☐ 1: Langer Tag
■ 2: Patientenkontakt

Navigation ▲

Nach hartem Kampf um einen Aufzug und ausgedehntem Suchen in den langen Fluren des Altenheimes nach dem richtigen Zimmer werden Sie endlich fündig.

Eine etwa 80 jährige Patienten liegt in Rückenlage im Bett. Sie hat die Augen geschlossen und atmet tief und schnell.

Auf den ersten Blick wirkt die Patientin krank, mit eingefallenen Wangen, faltiger, trockener Haut und einem leeren, ausdruckslosen Gesicht.

❓ Question:

Was machen Sie als erstes?

✏ Multiple Choice Answer: 1 of 5 answers is correct

Please select your answers.

A ○ Bewußtseinskontrolle
B ○ Sauerstoffsättigung messen
C ○ Notfall - EKG ableiten
D ○ 12 - Kanal - EKG ableiten
E ○ Pupillenkontrolle

> Submit   *The number of given answers does not match the number of correct answers*

http://vhb.casus.net/

E-Learning

Now your input … !

- Examples, Experiences?
- Which systems do we call "E-Learning" systems?
- Which computerized systems do we use in daily life to improve our knowledge and skills?

Examples of E-Learning

(From classroom contributions)

- *Language Self-Learning System (Flip)*
- *Online Tutorials*
- *Online manuals*
- *Online fora (eg. Stack overflow)*
- *Wikipedia*

Categories of E-Learning

- *(to be derived in classroom)*

What you are about to see is not a video but rather an example of the type of e-learning that can be commissioned for you or selected 'off-the-shelf' from our library of 30+ courses.

Our e-learning is not produced on a Hollywood sized budget. We find in 95% of cases the cost is comparable or cheaper to produce than your existing e-learning provider.

Press the green button to proceed through the presentation.

⚠ **Warning. May contain jokes**

MENU

| Introduction | Effective E-Learning | Cost Effective | Final Word |

ⓘ end

In order to drive safely, you need to be at your best and be as alert as possible.

Some activities can seriously affect your performance whilst driving and cause a danger to yourself and those around you.

MENU

Praise or Criticism?

- *Different types of learners and techniques*
- *Different types of knowledge - related to presentation*
- *Clicking a green button - interactive?*
- *Too much information in parallel, modality overload*

An Experienced Educator on E-Learning

"[...] this [...] company showed me software that had a cute animated character telling you things you didn't want to know and asking you questions you didn't care about to answer to, about a system you didn't want to learn how to use all that much in the first place, and weren't going to learn to use by being told about it ... all with nary a story to be found."

Roger C. Schank 2005

nary - (used with singular count nouns) colloquial for 'not a' or 'not one' or 'never a'; "heard nary a sound"   http://www.thefreedictionary.com

Outline

1. Introduction

2. Physiological and psychological foundations

3. Theories of learning

4. Typology of learning environments

5. Principles of multimedia learning

6. Motivation theory

7. Development of learning applications

8. Multimedia didactics

9. Contextual Learning

Literature

… There is a huge amount of literature on e-learning, but no single comprehensive textbook for the lecture.

- Gilly Salmon: E-Tivities: The Key to Online Learning, RoutledgeFarmer 2005 (Reprint von Kogan Page 2002)

- Roger Schank: Lessons in Learning, e-Learning, and Training. Perspectives and Guidance for the Enlightened Trainer, Pfeiffer/John Wiley 2005

- William Horton: E-Learning by Design, Pfeiffer/John Wiley, 2nd ed. 2011

… further literature references in individual chapters

1 Introduction

Learning: The Nuremberg Funnel

"Poetischer Trichter, …
in VI Stunden
einzugießen"
G. Ph. Harsdörffer, 1647

Is "learning" just an
issue of transferring
information to an
individual?

Image:
e-ducation.datapeak.net

Information and Knowledge
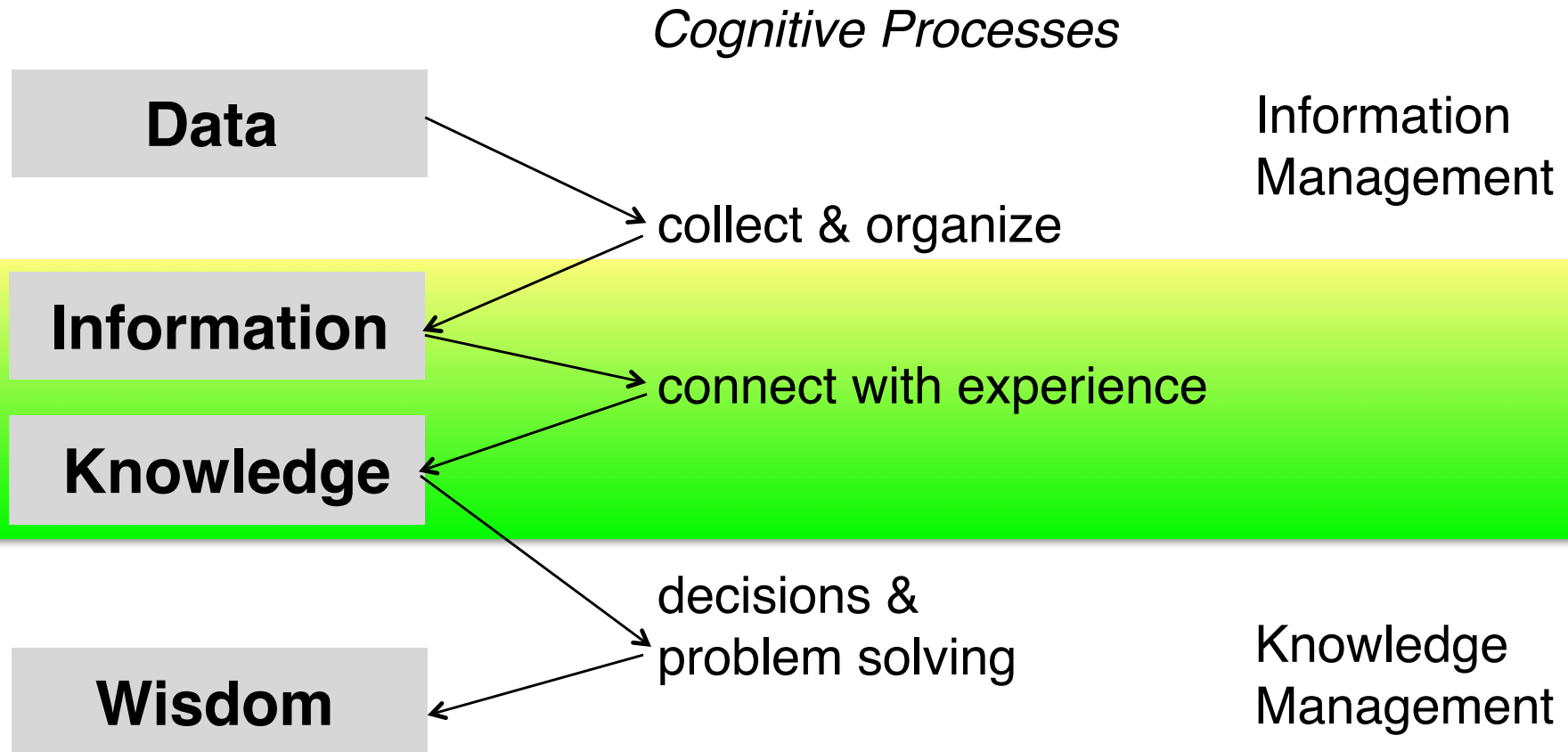
A knowledge management view, based on Willke 1996

Can You Identify Different Classes of Knowledge?

- To know that <ul> is the HTML tag for bullet lists
- To know that each opened tag in HTML needs to be closed
- To know how to exchange a hard disk drive for an SSD in a PC
- To know how to carry out object-oriented system analysis for a problem domain
- To know when Germany joined the European Union
- To know why a plane can fly
- To know the shortest way to seminar room A U113 in the main building of LMU

Types of Knowledge

Declarative	Conceptual	Procedural
Facts	Concepts	Strategies
"Power is measured as amount of energy per unit time"	"ebb and flow of the sea are caused by …"	"If the car refuses to start, check the following: …"
explicit	explicit	often only implicit
„knowing that …"	„knowing how …"	„Know-How" Skill

J.R. Anderson: Language, memory, and thought (1976)

Learning: A Classical Definition

"Learning is a relatively permanent change in behavioral potentiality that occurs as a result of reinforced practice."

Gregory A. Kimble
Hilgard and Marquis' conditioning and learning. New York 1961

INDEPENDENT VARIABLE   INTERVENING VARIABLE   DEPENDENT VARIABLE

REINFORCED PRACTICE — LEARNING — RELATIVELY PERMANENT CHANGE IN BEHAVIOR
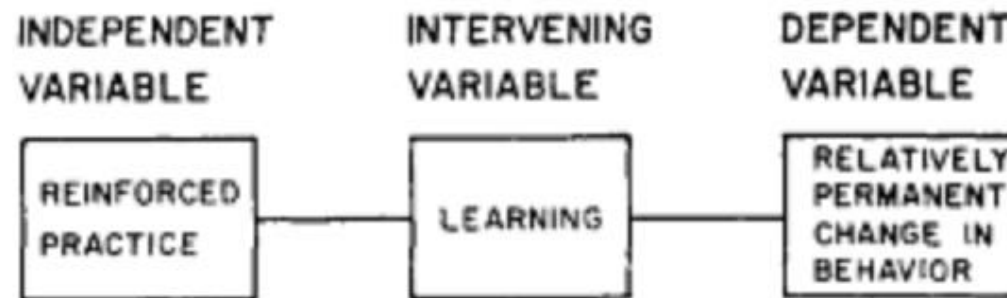
FIG. 1. The status of the concept, learning, as an intervening variable.

G. A. Kimble 1964

E-Learning = Learning with Computers

Picture: NY Times / schoolofone.org

Claimed Advantages:

- Cost effectiveness
- Independence of time and space
- Practice with automated tailored feedback
- Integration of collaboration with self-study
- Use of simulation to accelerate expertise and avoid risks   Clark/Mayer

Multimedia Learning:
Do Multiple Information Channels Sum Up?
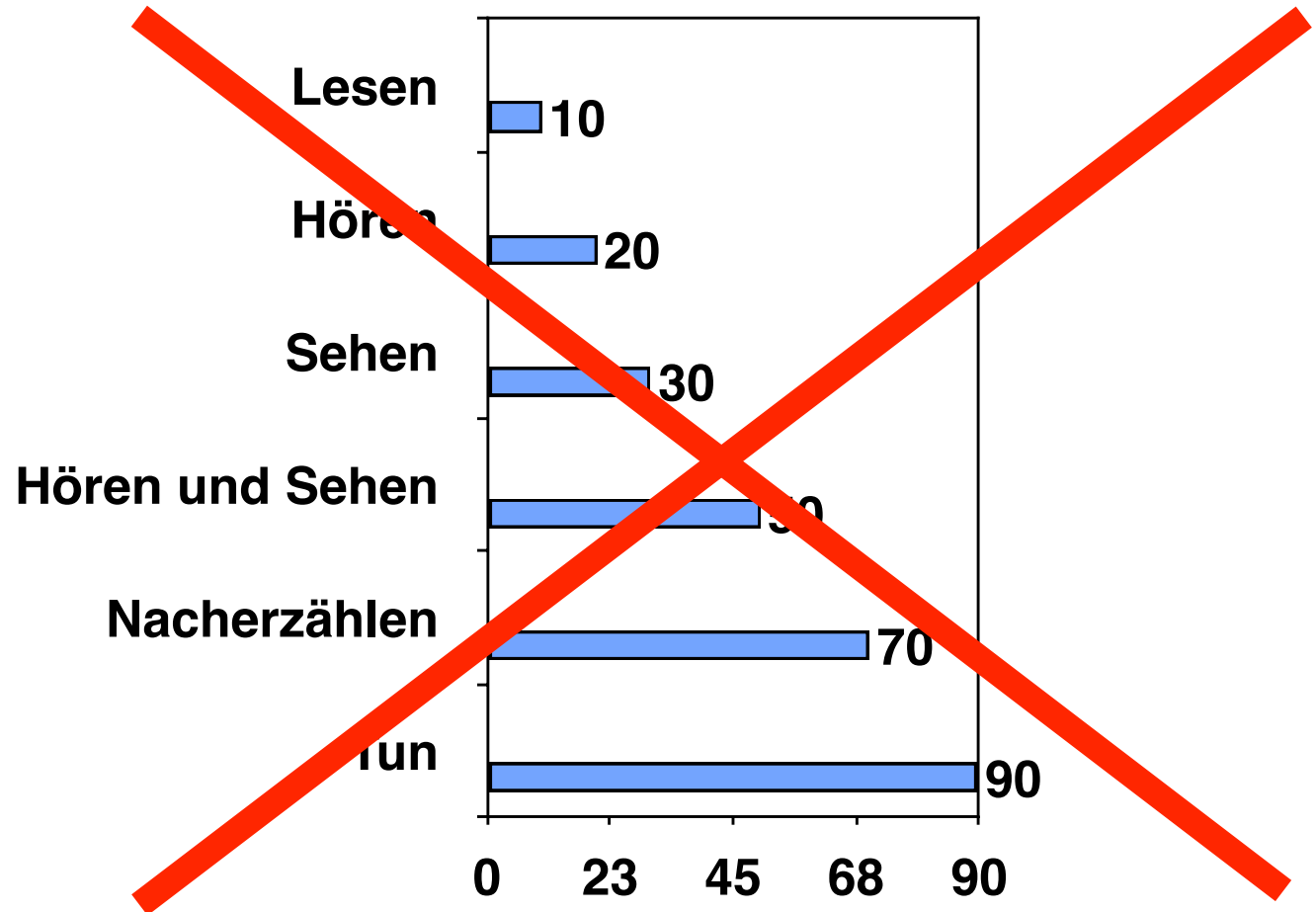
- „Diese Darstellung ist die wohl populärste in der gesamten Medien- und Instruktionspsychologie. Eine wissenschaftliche Quelle wird man allerdings vergebens suchen."   (B. Weidenmann)

Clark: Media Will Never Influence Learning

- Richard E. Clark: Media Will Never Influence Learning, *Educational Technology Research and Development* Vol. 42(2) 1994, pp. 21–29

- Media are "mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers groceries causes changes in our nutrition" (Clark, 1983)
- Design technologies vs. delivery technologies
- Structural vs. surface features
  - Empirical studies often are not able to isolate the instruction design and to ensure that this is equal in the control condition
- "Kozma *[discussion opponent]* agrees with me that evidence does not yet support the claim that media or media attributes influence learning."
- "Media [...] are also not directly responsible for motivating learning"

Kozma: Impact of Medium on Learning

- Robert B. Kozma: Learning with Media, *Review of Educational Research*, Vol. 61(2) 1991, pp. 179–211

- "… capabilities of a particular medium, ***in conjunction with methods that take advantage of these capabilities***, interact with and influence the ways learners represent and process information and may result in more or different learning when one medium is compared to another. …"

- "the primary effect of a medium's technology is to enable and constrain […] the symbol systems it can employ and the processes that can be performed with it."

  – Computer: Can proceduralize information and establish rules (e.g. objects obeying laws of physics)

  – Multimedia environments: Help learners to connect their knowledge to other domains, help to build and analyze mental models of problem situations

- "Medium and method have a more integral relationship; both are part of the design."

1   Introduction

1.1   Warm-Up and Formalities

1.2   Definitions: Learning, E-Learning, Multimedia Learning

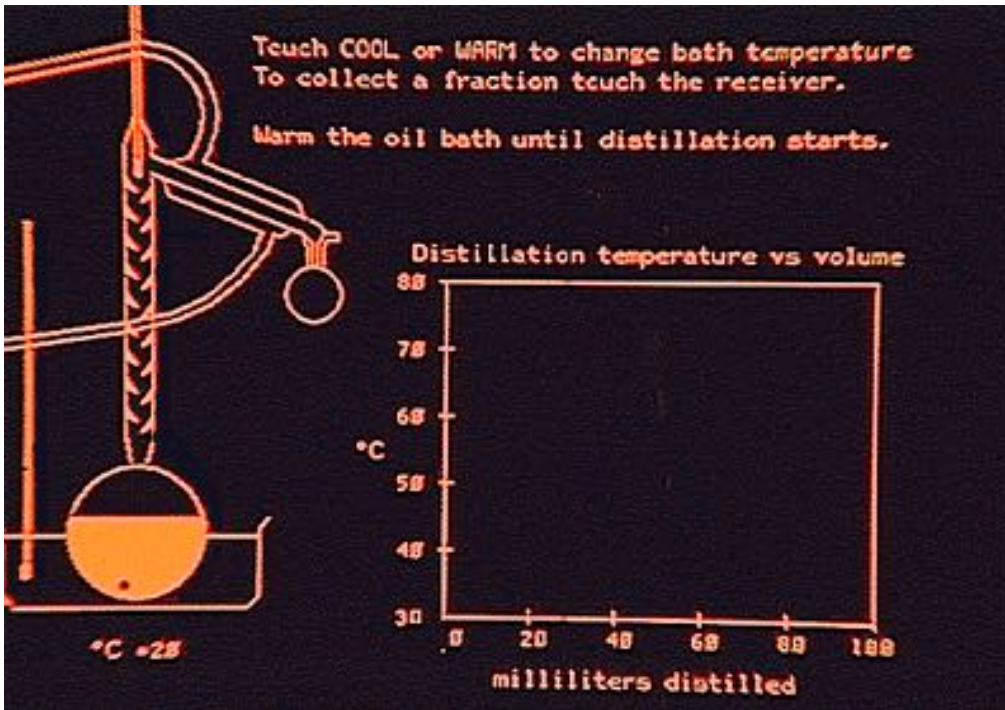1.3   Historic Highlights of E-Learning   ⬅

Project PLATO

- Programmed Logic for Automated Teaching Operation
    - University of Illinois, Donald Bitzer
    - PLATO I – IV (1960–1972)
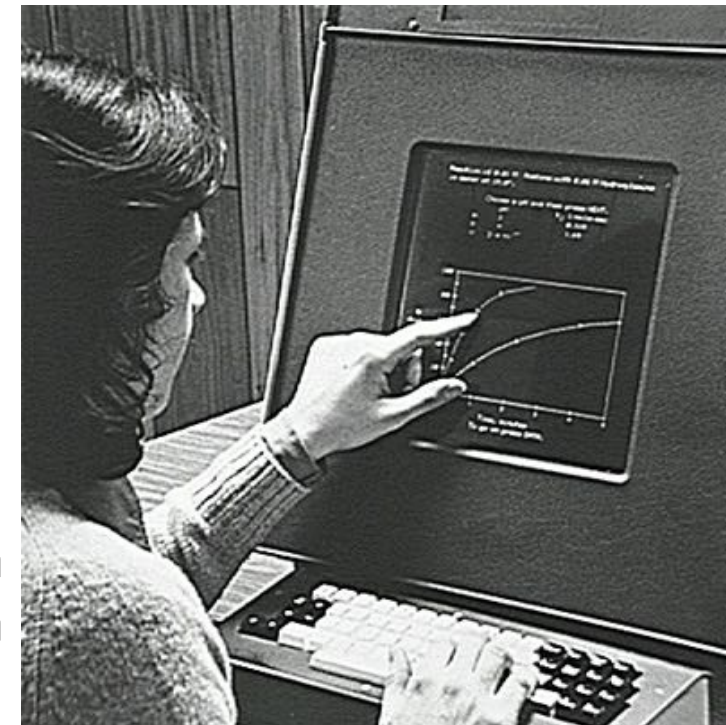   - Commercial product until 1986

Source: http://archives.library.illinois.edu/

PLATO IV CDC Mainframe

Graphics Display (Plasma)

Touch Screen (!)

Project TICCIT

Interactive Television system : TICCIT

- Time-Shared Interactive Computer
  Controlled Information Television (1971 – 1977)
  - MITRE Corporation, University of Texas and Brigham Young University
  - Together with PLATO 60 mio $ funding
  - Audience: mainly adult learners
    (cable TV based)

Logo (S. Papert, 1968):
Physical and Virtual Turtles
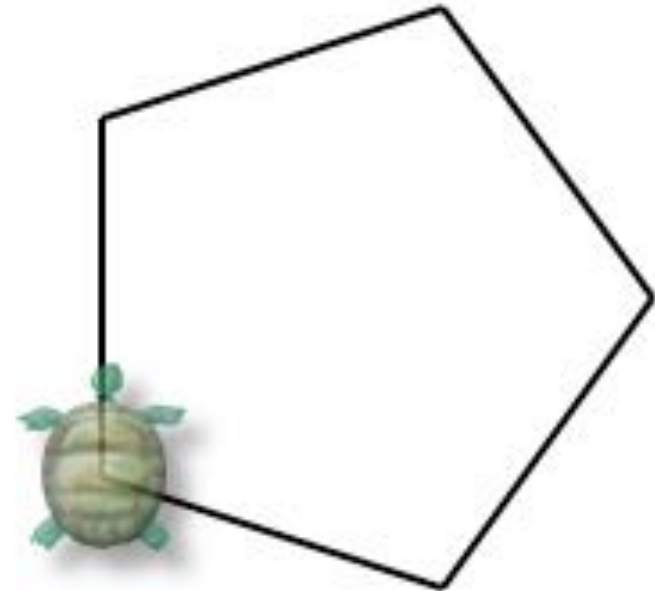

```
to polygon
repeat :sides
      [ forward :size
        right 360/:sides ]
polygon 5 100
```

Computers in the Classroom

Apple II
(1977–1993)
ca. US$ 1300

A Statement from 1999

> "The next big killer application for the Internet is going to be education. Education over the Internet is going to be so big it is going to make e-mail usage look like a rounding error in terms of the Internet capacity it will consume."
>
> John Chambers, 1999
> CEO of Cisco Systems

Keynote speech at "COMDEX" 1999,
quoted according to
T.L. Friedman, "Next, it's E-ducation",
New York Times, 17 Nov 1999, p A14

Hype Cycle of Learning Systems

- as suggested by http://www.leerbeleving.nl/