

Lernsoftware = Didaktik + Informatik

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The „Learning“ in e-„Learning“ ?

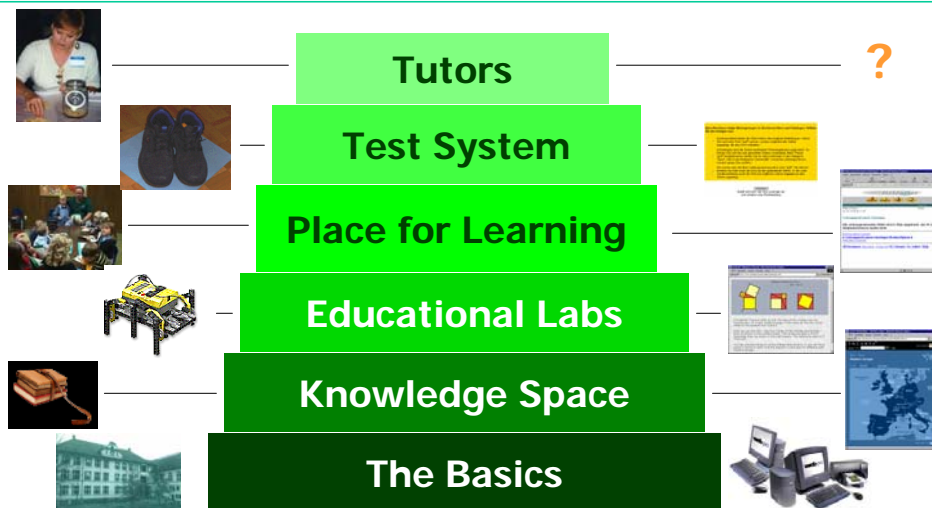
5 High-Level Guidelines for Creating
Interactive Learning Environments

Future Directions of
Interactive Learning Environments

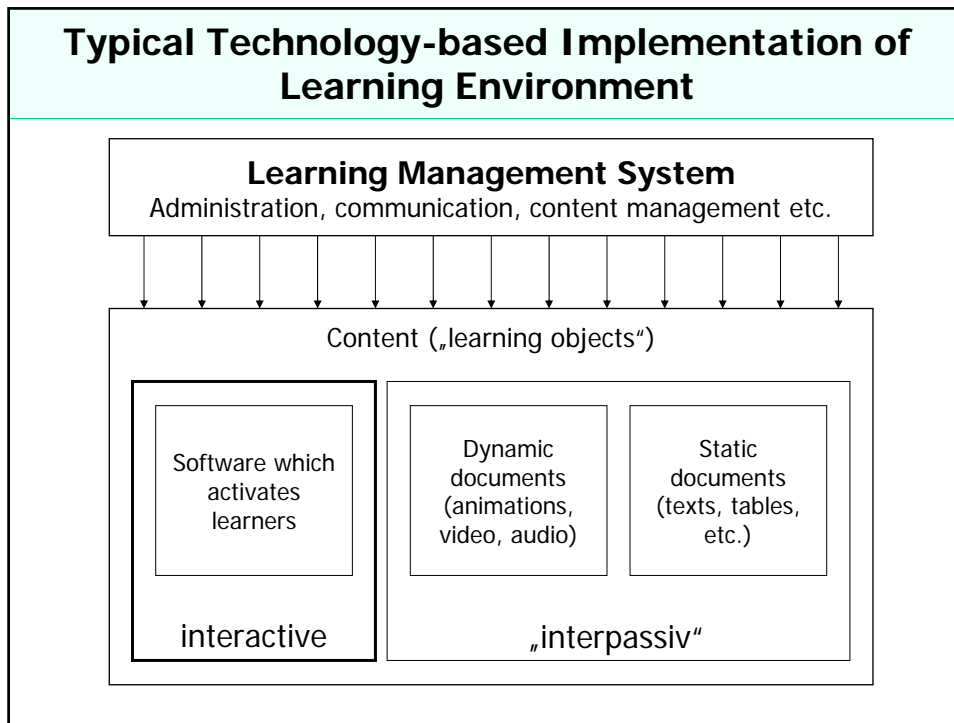
Components of a Learning Environment

Real World

Virtual



M. Pilloud, W. Hartmann. Talk at „Web Based Training“, Olten, 2000.



e-„publishing“ in e-„learning“: Web publishing of learning materials

Tutors
Test System
Place for Learning
Educational Labs
Knowledge Space
The Basics

Do it your Soil

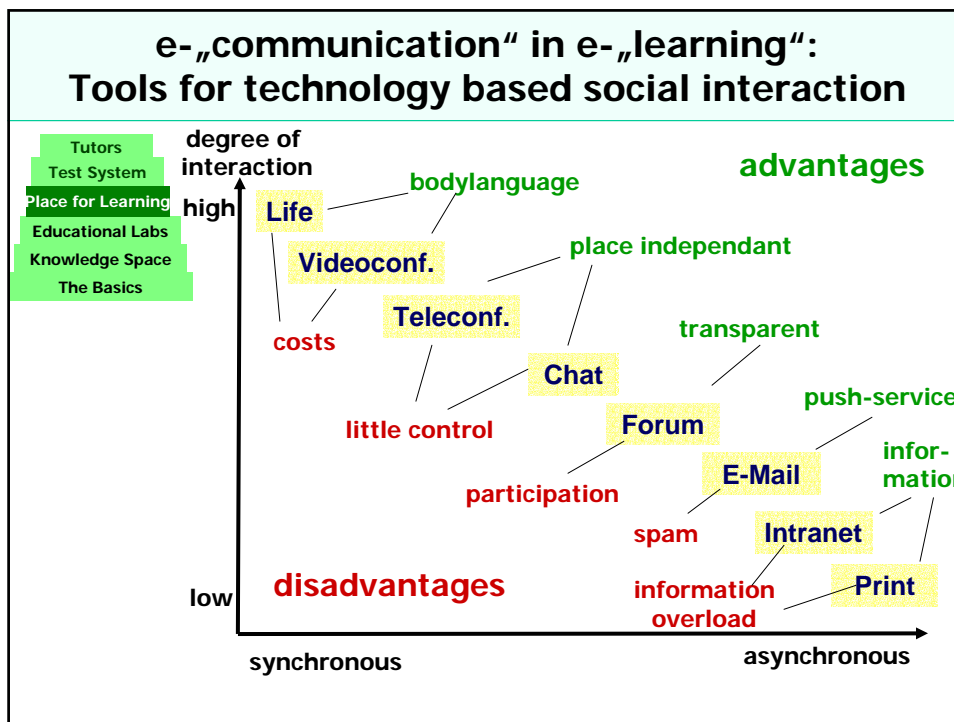
Home
About Do-It-Your-Soil
Introduction
Overview DIYS
Concept
Examples
Overview examples
Module 1 Demo [German]

T/S DIAGRAMM: EINLEITUNG

distribution of material, not learning!

Kartoffelfeld in Langnau i.E.: Kartoffeln verdunsten enorme Wassermengen. Pro Knolle werden mindestens 10-15 Liter Wasser benötigt.
Photo A.Schönborn, Mai 2002

Sie haben bisher gelernt: Die Saugspannung im Boden, das Dampfdruckdefizit der Atmosphäre und das Regulationsvermögen der Pflanzen beeinflussen die Transpiration. Der bedeutendste Faktor in diesem Triumvirat ist die Saugspannung.



**e-„communication“ in e-„learning“:
Much communication, little CSCL**

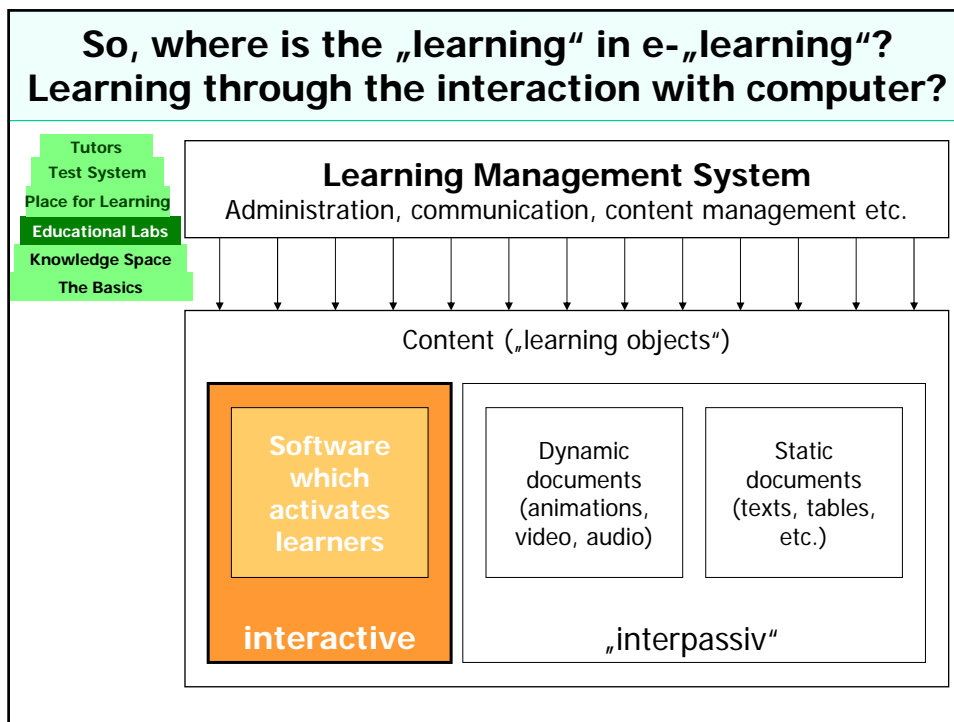
Administration:
registering with a course etc.

Organization:
Scheduling, exchanging documents etc.

Communication:
Mailing, chatting etc.

Computer Supported Collaborative Learning?

True CSCL is quite hard to do,
for the teacher as well as for the learners!



**Human-Computer Interaction:
Learning through the interaction with computer**

Social Notion of Interaction:
Interaction between users through the use of ICT as a medium (**computer mediated human-human communication**). This is a relatively new phenomenon.

Technological Notion of Interaction:
Interaction between users and the computer (**human-computer interaction**), i.e. the interaction of users with teaching materials. This is an old dream – remember CAL, CAI, CBT, WBT, ...

Learning Through Human-Computer Interaction: Interactive Learning Environments

The primary questions must be:

**What can be done with technology
that could not be done just as well without it?**

**Does technology yield an added value
from a pedagogical perspective?**

Even then, ILEs pose tough challenges:

**You need subject matter experts with (at least)
a sound grasp of pedagogy.**

**You need skilled software engineers with (at least)
a sound grasp of design and usability.**

That is, ILEs are expensive!

ILE Guideline #1: Content based on fundamental ideas

A **fundamental idea** with respect to some domain is a schema for thinking, acting, describing, or explaining which **is applicable in different areas,**

may be demonstrated and taught on **every intellectual level,**

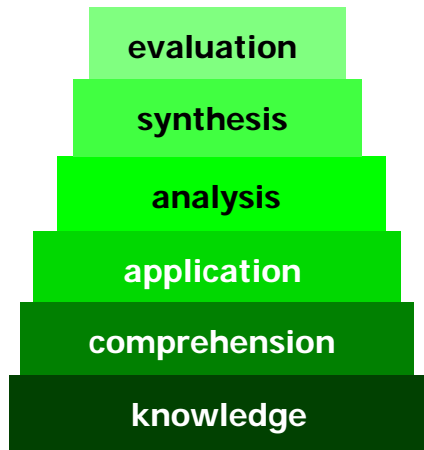
can be clearly observed in the historical development and will be **relevant in the longer term,**

and **is related to everyday language and thinking.**

Fundamental ideas guarantee the selection of content which is cognitively demanding, relevant, and long-lived – **justifying the expense of building ILEs.**

[Bruner 1960; Schwill 1994]

ILE Guideline #2: Different Cognitive Levels



ILEs should cover multiple levels, also addressing higher cognitive skills.

If they don't, they will become boring quickly, not engaging the learners.

If they don't, why go to the expense of implementing them?

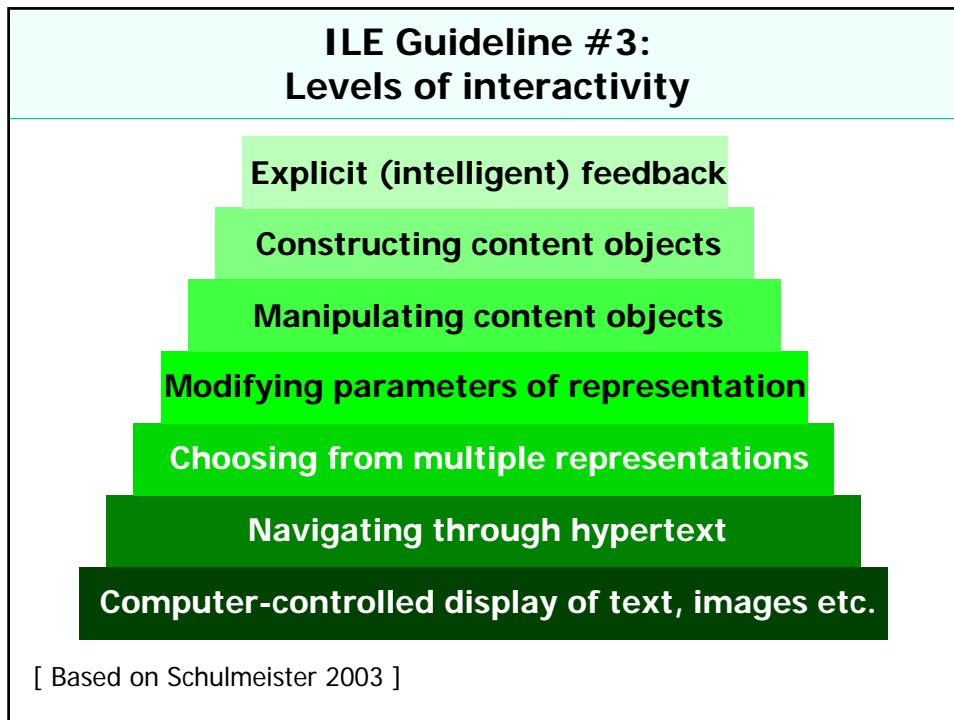
[Bloom, 1956]

ILE Guideline #3: High level of (human-computer) interactivity

„You either feel involved in the computer representation or you do not.

The crucial point is the ability to interact with the representation, and not how often the software feigns communication with you.“

Brenda Laurel (1993): Computer as Theatre, Addison-Wesley Publishing.



ILE Guideline #3: Levels of interactivity
Interactivity level 4: Modifying representation

AMUSEMENT PARK PHYSICS
What are the forces behind the fun?

**Users can play with parameters like height, length etc.
but can not create their own roller coasters**

[www.learner.org/exhibits/parkphysics/]

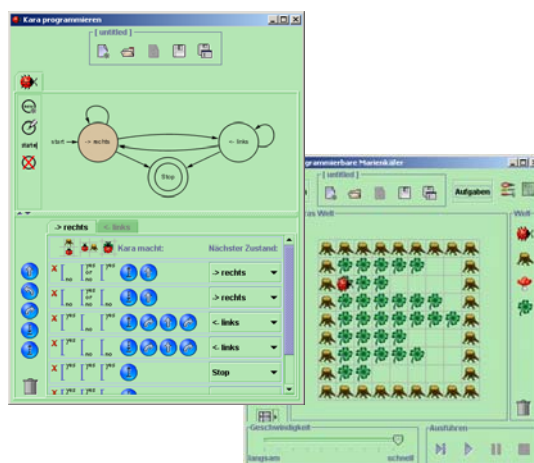
ILE Guideline #3: Levels of interactivity
Interactivity level 5: Manipulating content



Users can control the actions of the robot's arm, in either of the two representations.

[www.educeth.ch/informatik/interaktiv/roboarm/]

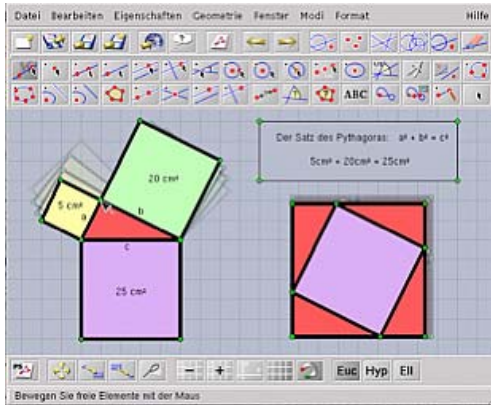
ILE Guideline #3: Levels of interactivity
Interactivity level 6: Creating content objects



Users create their own worlds, write their own programs for the ladybug.

[www.educeth.ch/karatojava/]

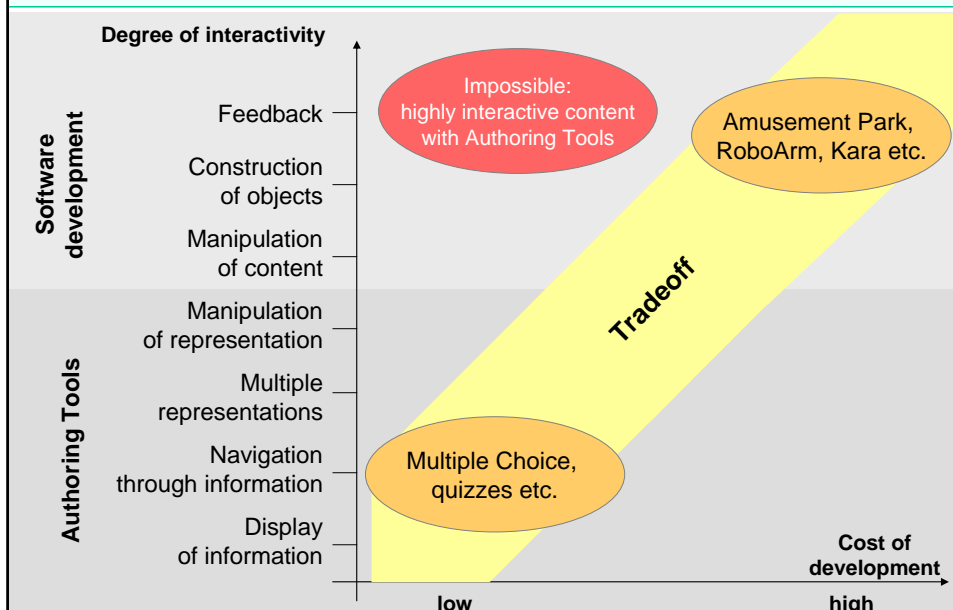
ILE Guideline #3: Levels of interactivity
Interactivity level 6: Creating content objects



Users create their own geometrical objects and proofs on their properties.

[www.cinderella.de]

ILE Guideline #3: Levels of interactivity
The Interactivity Tradeoff



ILE Guideline #4: Visualization & Usability



ILE are used for learning.

Learners should be able to start learning immediately.

ILEs must therefore be as easy to use as possible.

Visualization allows more efficient understanding than formal displays.

ILE Guideline #5: Designing for the Nintendo Generation



Today's kids grow up in multimedia-rich environments, using devices their parents don't even know exist.

ILEs should strive to be (reasonably) attractive.

Also, don't use yesterday's technology to implement tomorrow's ILEs!

[Guzdial, Soloway: Teaching the Nintendo generation to program. Communications of the ACM, 45 (7), 2002.]

Future directions for ILEs? Combining ILEs and CMC / CSCL



**West Point Bridge
Design Contest:**

**Combines ILE with
web-based contest.**

Rank	Team Name	Members	City/State	School	Submission
1	Ma Performance	David Jacob	Alachua, FL	Alachua High School	Sat, Mar 27, 2004, 9:10 PM
2	UNDERGROUND	Sheng Andrew	Frederick, TX	Frederick High School	Thurs, Mar 25, 2004, 2:35 AM
3	Let's Trust	Edge (Dad) (Student) Andrew	San Antonio, TX	Washburn High School	Thurs, Apr 1, 2004, 10:28 PM
4	Shoukry & Co	Jamir Robert	San Antonio, TX	Douglas Marshall High School	Fri, Apr 2, 2004, 1:41 PM
5	JAB	Zak Jacob	Frederick, TX	Frederick High School	Mon, Feb 23, 2004, 10:37 PM
6	Skidmore	Michael	Alachua, FL	Alachua High School	Mon, Apr 5, 2004, 12:28 PM
7	Daxxon	James Evan	San Antonio, TX	Douglas Marshall High School	Sun, Mar 7, 2004, 12:51 AM
8	Spinning Wheels	Rory Michael	San Antonio, TX	Douglas Marshall High School	Wed, Mar 3, 2004, 9:58 AM
9	Bottlehead Duo	James Manny	San Antonio, TX	Washburn	Tues, Feb 9, 2004, 9:28 PM
10	CCDrapTeam	Martin	Chamblee, GA	Chamblee City High School	Wed, Feb 25, 2004, 10:40 AM
11	Woon	Josephine RosaLu	San Antonio, TX	Washburn	Fri, Feb 20, 2004, 10:58 AM

[bridgecontest.usma.edu]

Future directions for ILEs? Combining ILEs and CMC / CSCL

We would love to ...

... see more good ILEs across the disciplines

**... see innovative integration of ILE and some
forms of CMC / CSCL**

**... see more collaboration with software
engineering departments to build ILEs**