

Multimediale Lehr- und Lernumgebungen

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A 1994 Forecast for 2004

Imagine it's the year 2004. What lessons do you think we might have learned about multimedia in the last ten years?

I spoke earlier of a revolution in the way humans access and learn information. It's underway now. Significant learning will take place in the design and testing of the multimedia-based human interfaces that will be used to view the unimaginably varied types of data located on the international broad-band data highway currently under construction. How people will navigate through this massive 'library' (and how they will pay for it) is yet to be determined.

During the coming years there will also be significant contributions to a 'new literature' made possible by interactive multimedia. One of my own personal interests is in creating multimedia projects that provide the vibrancy and depth of a Hermann Hesse novel, a Brahms concerto, and a DaVinci painting. Works that can enthrall the end user. So far, it is usually mechanical failure that causes users to weep at their keyboards, not immersion in a well-conceived interactive love story or other more literary venture.

Tay Vaughan (The Computing Magazine, Issue 4, 1994)

Die Politik in den letzten zehn Jahren

- Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie, „Zur technologischen Leistungsfähigkeit Deutschlands 1996“:
„Neben den traditionellen Produktionsfaktoren Arbeit, Boden und Kapital gewinnt der vierte Faktor – das Wissen – erheblich an Bedeutung. Bildung, Ausbildung und ganz besonders Weiterbildung entscheiden über die wirtschaftliche Entwicklung und die Arbeitsplätze der Zukunft.“
- Learning in the information society - Action plan for a European education initiative (1996-98)
- Entschliessung des Rates vom 6. Mai 1996 über multimediale Lernprogramme in den Bereichen allgemeine und berufliche Bildung
Amtsblatt nr. C 195 vom 06/07/1996 S. 0008 - 0011
- Viele politische und private Initiativen...

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>

Inhalt

- Lehr- und Lernumgebungen
 - Was ist Lernen?
 - Kann man Lernen optimieren?
- Multimediale Lehr- und Lernumgebungen
 - für Lernen sinnvoll und wirkungsvoll?
 - Welchen konkreten Effekt haben Multimedia-Technologien?
 - Wird Lernerfolg durch Multimedia verbessert oder sogar verschlechtert?
- Didaktik des Multimedia-Lernens
 - Gestaltung von Inhalten für optimalen Lernerfolg
- Lernen als sozialer Prozess
 - Computergestütztes Lernen in Gruppen (“CSCL”)
 - “Blended Learning” (Mischung traditioneller/computergestützter Formen)
- Warnung:
 - Kein reiner Informatik-Stoff! (Psychologie, Didaktik)

Organisatorisches

- Die Lehrveranstaltung (2V+2Ü) ist eine Mischung aus:
 - Vorlesung (13 Doppelstunden)
 - Übungen im Seminarstil (Leitung: Arnd Vitzthum)
 - ... plus eigene Freiarbeit
- Seminarstil
 - Praktische Erfahrungen mit Lehr- und Lernsystemen
 - Individuelle Zuweisung von Themen (= Software)
 - Bericht in Seminargruppe
 - » Eigene Erfahrung
 - » Gruppenlernen
 - Evaluation entsprechend vorgegebenem Schema
 - » Später: Kritik/Verbesserung des Schemas
- Leistungsnachweis durch Seminarvortrag
- Einbringung in mündliche Prüfung des Fachgebiets MM für Medieninformatik-Studierende (A für Informatik-Studierende)

Deutsch & Englisch

- Im Hauptstudium sind viele aktuelle Materialien nur in englischer Sprache verfügbar.
 - Zu Lehr- und Lernumgebungen gibt es relevante deutschsprachige Literatur
- Austausch von Materialien zwischen Lehre und Forschung scheitert oft an der deutschen Sprache.
- Konsequenz:
 - Die Lehrmaterialien zu dieser Vorlesung (v.a. Folien) sind teilweise in englischer, teilweise in deutscher Sprache gehalten.
 - Zu Grundlagenthemen werden vorwiegend englischsprachige Folien benutzt.
 - Der Unterricht findet in deutscher Sprache statt.
 - Es wird durchgehend versucht, die Fachbegriffe in beiden Sprachen einzuführen.

Vorläufige Gliederung


1. Einführung
2. Physiologische und psychologische Grundlagen
3. Lerntheorien
4. Geschichte der Lernmaschinen
5. Empirische Untersuchungen zum Multimedia-Lernen
6. Entwicklung von Lernanwendungen
7. Mediendidaktik für Multimedia-Inhalte
8. Computer-Supported Cooperative Learning
9. Multimediale Unterstützung traditioneller Lehr- und Lernformen
10. Ausblick

Literatur

- Andreas Holzinger: Basiswissen Multimedia, Band 2: Lernen, Vogel Verlag 2000
- Helmut Niegemann, Sylvia Hessel, Dirk Hochscheidt-Mauel, Kristina Aslanski, Markus Dalmann, Gunther Kreuzberger: Kompendium E-Learning, Springer 2004
- Ruth Colvin Clark, Richard E. Mayer: e-Learning and the Science of Instruction, Pfeiffer/John Wiley 2005
- Ludwig J. Issing, Paul Klimsa (Hrsg): Information und Lernen mit Multimedia und Internet, Beltz PVU 2002
- Joachim Hasebrook: Multimedia-Psychologie, Spektrum Akademischer Verlag 1995
- Roger Schank: Lessons in Learning, e-Learning, and Training. Perspectives and Guidance for the Enlightened Trainer, Pfeiffer/John Wiley 2005

... diverse weitere Literatur bei den Einzelkapiteln

1 Einführung

- 1.1 Einordnung und Begriffsbestimmung 
- 1.2 Erwartungen und die Realität

Literatur:

Bernd Weidenmann: Multicodierung und Multimodalität im Lernprozess.
In: Issing/Klimsa 2002

Lernen: Der Nürnberger Trichter

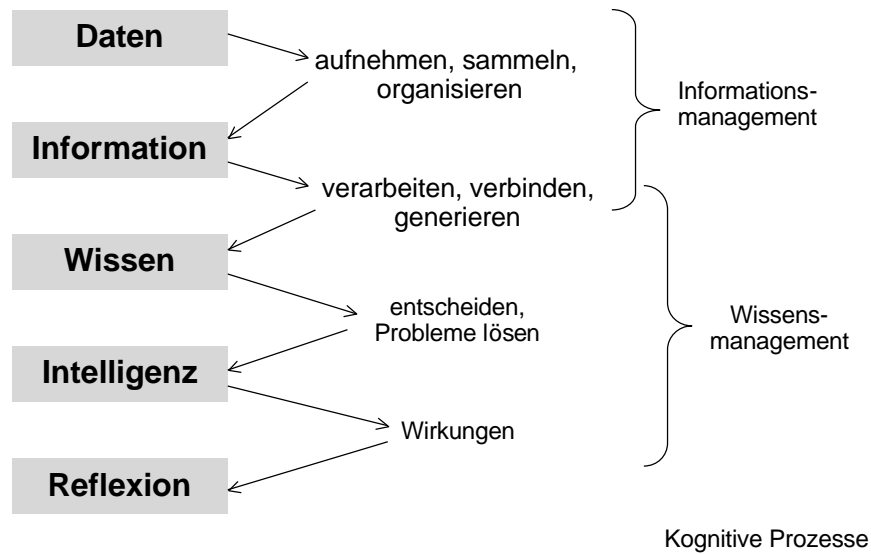


Wir lernen, um Wissen aufzunehmen, oder ist es doch anders?

Wissen ist Information, oder ist es doch mehr?

Quelle: www.laptronic.de

Daten, Wissen und die Anwendung



Arten von Wissen

Deklarativ (declarative)	Konzeptuell (conceptual)	Prozedural (procedural)
Faktenwissen	Konzeptwissen	Strategiewissen
z.B. „Leistung ist Arbeit pro Zeiteinheit“	z.B. „Ebbe und Flut entstehen dadurch, dass ...“	z.B. „Wenn das Auto nicht anspringt, prüfe ...“
Existiert explizit	Existiert explizit	Existiert oft nur implizit
„knowing that ...“	„knowing how ...“	„Know-How“ Können

- J.R. Anderson: ACT: A simple theory of complex cognition (1996) (basiert auf Arbeiten seit den 70er Jahren)

Hard Skills and Soft Skills

- There are hard skills and there are soft skills.
- Hard skills are specific, can be (generally) easily taught, and include things like being able to read a book or read a cardiac monitor. Hard skills are the minimum skills necessary to do a job. Most people with the same level of education and experience should have roughly the same level of hard skills.
- Soft skills, such as bedside manner are often intangible and, therefore, not easily taught. They tend to be more of a function of personality characteristics such as motivation, sociability, and work ethic. Some soft skills include leadership, creativity, ambition, accountability, ability to teach, interpersonal abilities, and reliability.
- Hard skills are the first screen used to weed out applicants who are obviously not qualified for a job. Beyond this, in the competitive selection process, most employers use soft skills to differentiate one candidate from another. As a result, job seekers can gain a competitive advantage over other candidates by gaining a firm understanding of their own soft skills and then clearly illustrating those skills to potential employers.

medhunters.com

Near Transfer and Far Transfer

- Clark/Mayer (2005): Declarative & conceptual knowledge = basis
- Two types of procedural knowledge:
 - *Near transfer*:
 - » More or less performed the same way each time
 - » E.g. How to create an annual statement in an accounting program
 - *Far transfer*:
 - » Tasks which do not have only one correct approach or outcome
 - » Situations occurring in reality may differ from situations in training
 - » Soft skills are often related to „far transfer“

E-Learning

- *E-Learning* is instruction delivered on a computer by way of CD-ROM, Internet, or Intranet with the following features:
 - Includes content relevant to the learning objective
 - Uses instructional methods such as examples and practice to help learning
 - Uses media elements such as words and pictures to deliver the content and methods
 - Builds new knowledge and skills linked to individual learning goals or to improved organisational performance

Clark/Mayer

E-Learning Goals

Goal	Definition	Example
Inform	Lessons that communicate information	<ul style="list-style-type: none">• Company history• New product features
Perform-procedure	Lessons that build procedural skills (near transfer)	<ul style="list-style-type: none">• How to log on• How to complete an expense report
Perform-principle	Lessons that build principle-based skills (far transfer)	<ul style="list-style-type: none">• How to close a sale• How to design a Web page

- Clark/Mayer

E-Learning Advantages

- Practice with automated tailored feedback
- Integration of collaboration with self-study
- Use of simulation to accelerate expertise
- More trivial advantages:
 - Cost effectiveness
 - Independence of time and space

Clark/Mayer

Charakterisierung medialer Angebote

	mono-	multi-
Präsentationsmedium (Hilfsmittel Ein-Ausgabe)	Monomedial: • Buch • Videoanlage	Multimedial: • PC + CD-ROM-Laufwerk • PC + DVB-T Tuner
Repräsentationsmedium/ Codierung (Symbolsysteme)	Monocodal: • nur Text • nur Bilder • nur Zahlen	Multicodal: • Text mit Bildern • Grafik mit Beschriftung
Perzeptionsmedium/ Sinnesmodalität (Symbolsysteme)	Monomodal: • nur visuell (Text, Bilder) • nur auditiv (Rede, Musik)	Multimodal: • audiovisuell (Bild und Ton)

Nach Bernd Weidenmann

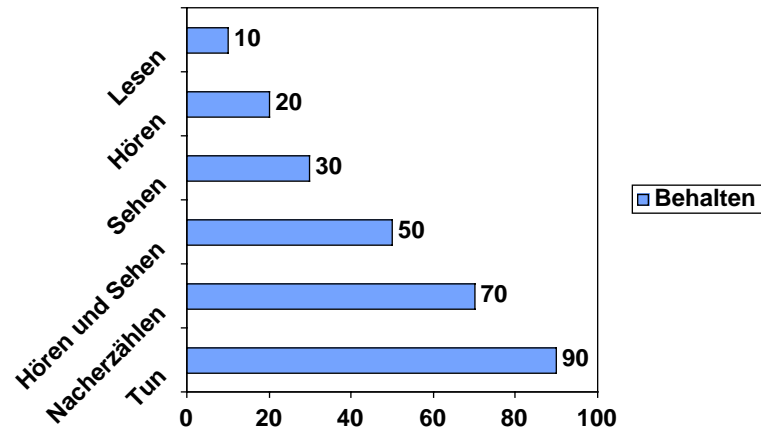
Multimedia...

„Multicodierung und Multimodalität als Kennzeichen von Multimedia“
(Issing/Klimsa)

Klassische naive(!) Annahme:

„Multimedia spricht mehrere Sinnesmodalitäten an ... und darum verbessert sich die Behaltensleistung für gelerntes Wissen.“

Naive Annahmen



- „Diese Darstellung ist die wohl populärste in der gesamten Medien- und Instruktionspsychologie. Eine wissenschaftliche Quelle wird man allerdings vergebens suchen.“ (B. Weidenmann)

1 Einführung

1.1 Einordnung und Begriffsbestimmung

1.2 Erwartungen und die Realität ←

The Third Wave, John Chambers

- John Chambers, Cisco CEO, January 2001:
 - The first industrial revolution brought together people, and machines and factories and it determined which companies and which countries got ahead, and which ones got left behind. The second industrial revolution will have the exact same effect of the first industrial revolution in terms of determining the futures of companies and countries, except that it will be over in two to three decades.
 - I am really talking about waves. The first wave occurring slowly if you are the first to move. You gain competitive advantage like Cisco did from e-commerce, customer support and employee support. However, over time, your competition will understand that, and as they begin to move in, your advantage is commoditized, and may even come down to zero.
 - By that time you had better be on the second wave. This is the virtual close and virtual manufacturing wave. Again, your competition will adjust and catch up. Your benefits are quicker by this time, because your company knows how to implement it, but your competition follows quicker.
 - Then your third wave is e-learning, e-convenience, etc, and you know where I am headed with this. The leaders will always be one to two waves ahead and the laggards always one to two waves behind.

www.ciionline.org

Three Main Pitfalls of E-Learning

- Failure to base e-learning on a job analysis
 - Cognitive skills are not readily observable
 - » How to *observe* the task of a systems analyst?
 - Experts cannot easily articulate how they accomplish mental tasks
- Failure to accommodate human learning processes
 - Over-use of technology can reduce the learning effect
 - Limits of human cognition which have to be taken into account
- E-Learning dropout
 - Dropout rates of 35 percent and above are common
 - Boring lessons, technological glitches, ...
 - Social experience and network of classroom is missing

Clark/Mayer

An Experience Report

- When I proposed we join in a European funded project [on e-learning] it met with widespread opposition within [our company]. People felt that we were purely a classroom training company and that online delivery would be against our core principles
- We wanted materials that allowed people to experiment ... and be guided to find their own solutions. All the materials we found were ... based heavily on telling and made little effort to actively involve the learner in finding solutions.
- ... many of the sites proved impossible to use, or involved software downloads that didn't seem to work. One site keenly sent daily emails with the tasks for the day. Although we didn't respond to the emails, ..., they confidently sent an email on the 10th day to congratulate us on completing the course!
- One hundred eager people signed up for the free trial and we sat back to await the results. And the result was ... less than twenty actually tried it. Many never found time, some tried it and got confused downloading the support software. We discovered one of the hidden secrets of online training. Many never complete the training. Some don't even start it. You will hear much about the wonders of how you can learn in breaks, in the evening, but little about the reality of how difficult many people find it to learn in the middle of the modern open-plan office.

www.lasa.org.uk

The Happy End

- Our big breakthrough came in the autumn of 1999 when our developer, Lucy Blake, ignored our instructions [...] and went off and built a full set of training materials based on the original principles we agreed.
- *Instead of telling, they asked and guided.* They worked with the live application, allowing you to experiment and make mistakes.
- Even though largely untested, the course was shortlisted for Online Course of the Year by the Institute of IT Training. One of the judges described it as 'the most innovative technology-based training project of the year'.

www.lasa.org.uk