Education Standards in School Informatics in Austria

Christian Dorninger
ISSEP Klagenfurt, 30.3.05

Education standards in IT

Agenda
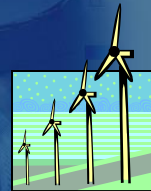
e-learning approaches

eFit – Austria project

Education standards

Informatics in VET-Systems

Model of IT standards

First experiences

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1

Learning in digital age

- ◁ **"e-learning" one of the important EU-topics**
- ◁ **IT infrastructure is a fact – no more discussion**
- ◁ **Media-centers vs. school development**
- ◁ **Outsourcing vs. competence centers**
- ◁ **Private-public partnerships will work**
- ◁ **Objectives, coaching, evaluation**
- ◁ **Partnership challenge in Europe (eTwinning)**
- ◁ **PC, PDAs.. as tools for indivudual learning**

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Blended Learning

targetgroup analysis

Classroom-learning

Online-Training

Blended Learning

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eLearning – approaches *cedefop, 2004*

Virtual classroom	Learning environment with use of internet; "remote learning"-quality
Blended learning	Synergy of classroom learning and online training; labs, networks
Collaborat. Learning	Group work with e- learning tools platforms; collaborative process
Supported self-learn	Resources and tutoring, coaching

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elearning with e-Fit Austria 2001-05

e-Learning	Learning with Computer / Internet - nonlinear, mediabased, networking
E-Learning platforms	evaluation of learning – platforms and contentmanagement systems www.virtual-learning.at
Community & Services	e-blackboards; newsgroups; virtual classrooms; online - courses
Content creation	Content - pool -> quality assurance -> content - repository

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Education standards

Quality
- Subject oriented
- Key compe-tences
- Obligatory for alll
- Accumu-lation
- Differen-ciation
- Compre-hension
- Real situations

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Education standards ⇔ enhanced learning

Content based learning:

➢Knowledge
➢Understanding
➢Application
➢Analysis
➢Synthesis
➢Meaning

Method based learning:

➢Heuristic Strategies
➢Information collecting
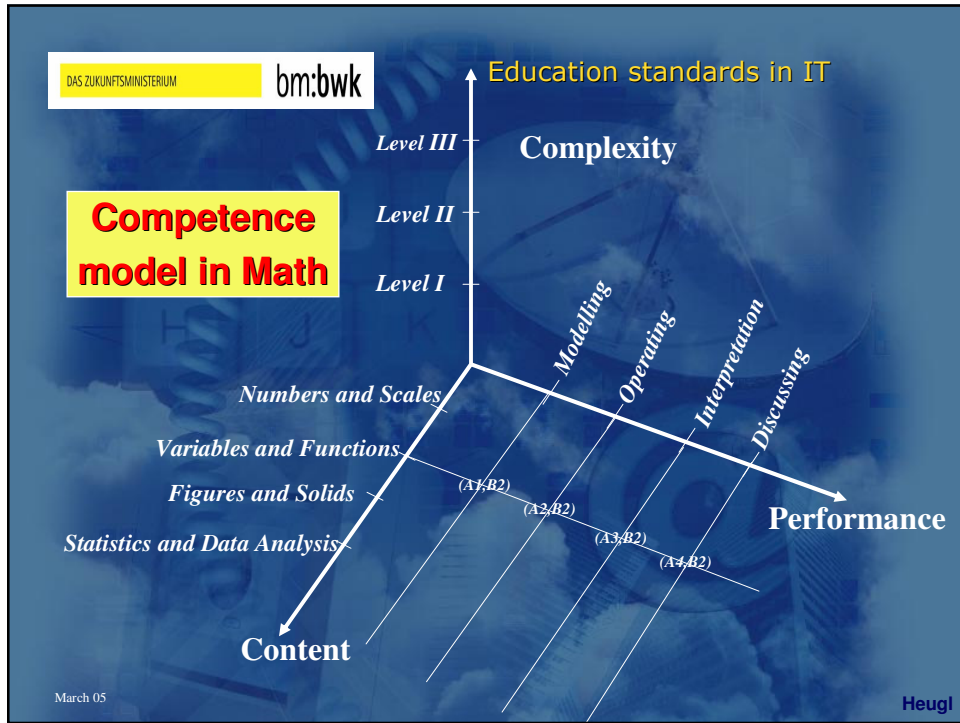➢Information structuring
➢Planing
➢Figures and structures
➢Presentation

Social-communicative learning:

➢Listening
➢Discussing
➢Argumentation
➢Cooperation
➢Leading
➢Integrating
➢Support

Personality learning:

➢Selfconfidence
➢Personal Values
➢Engagement
➢Developing interests

➡ **Math and Informatics with intersubjective competences**

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Slide 1

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Education standards in IT

Level III

Complexity

Level II

Competence model in Math

Level I

Modelling *Operating* *Interpretation* *Discussing*

Numbers and Scales

Variables and Functions

Figures and Solids   (A1,B2)

Statistics and Data Analysis   (A2,B2)

(A3,B2)

(A4,B2)

Performance

Content

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Slide 2

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Education standards in IT

Formulating Education standards

A General math/Informatic competences	B Content oriented math-competences
A4: Arguments und Proving	**B1: Working with numbers and scales**
A4.1 Proving a decision for a specific solution	**B1.1 Coordinate different numbers to different number areas.**
A4.2 Proving a falsification	**B1.6 Skills in percentage calculation.**
A4.3 Presume a solution by trial and error and prove it. •	**B1.8 Working with scales.** •

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Formulation of tasks on different levels

Students might develop various formulas to express this relationship on the basis of a table or their reasoning about the situation; for example, "You need $L + 2$ tiles across the top and the same number across the bottom. And you need W tiles on the left and the right. So all together, the number of tiles needed is ?
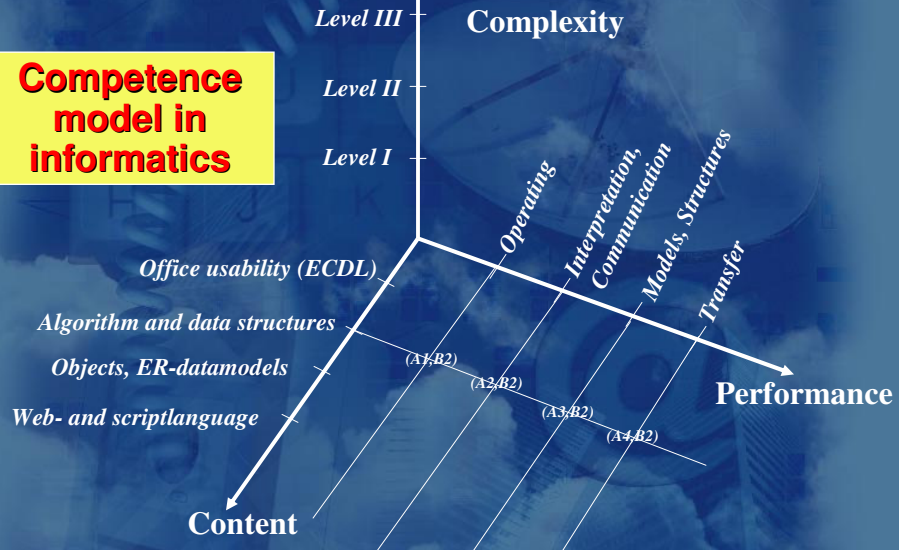
$$\text{Solution: } T = 2(L + 2) + 2W$$

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Heugl

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Level III **Complexity**

Level II

Competence model in informatics

Level I

Operating

Interpretation, Communication

Models, Structures

Transfer

Office usability (ECDL)

Algorithm and data structures

Objects, ER-datamodels (A1;B2)

(A2;B2)

Web- and scriptlanguage (A3;B2)

Performance

(A4;B2)

Content

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IT- standards ⇔ levels of competence

Level 1: ECDL-Office

➢OS (MS/Open S.)
➢Textprocessing
➢Speadsheet
➢Databases
➢Presentation
➢Internet-Communication

Level 2: Programming

➢Programming styles
➢Data structures
➢Algorithm
➢Data models
➢Modularisation (Procedures, functions
➢Files, Pointers, Objects

Level 3: IT-expertise

➢Certification in Networks, Net-OS, Database, ERP, Webtechnologies, LMS-plattforms (?)

Level 4: Science (at Uni)

➢ Systematic approach,
➢ Research
➢ Developing new software (concepts)

➡ **Different approach to the four levels**

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Experiences since 2000

1. **Economy of scale:** 100.000 ECDL, 3500 IT-certificates, 2000 ECDL-Advanced,….

2. **Transitions** from level 1 to level 2 – form office to programming is cruical point:

"Visual Basic for Application has all possibilities, to adapt packed standard software to individual needs- the possibilty of adapting standard software is an important message.

VBA-environment has good usability, editor, contexthelp, debugger and tracer .. "

Prof. E.Neuwirth, 24.5.93

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Slide 1

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A nice transition….

Makrorecorder in Excel (Extras/Macro recording..)

EXCEL-Programm recorded (small table..)

Test of macro (name or shortcut..)

Correcting macro (cancel redundant code)

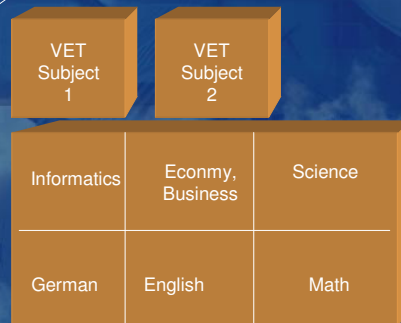**Improving logical mistakes** ("recordning from position..x…")

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Saitenschwingung				
				Amplitude
Zähler	Winkel	Sinus	-Sinus	
0	0	0	0	
1	0,34906585	0,00291352	-0,00291352	
2	0,6981317	0,00547562	-0,00547562	
3	1,04719755	0,00737728	-0,00737728	
4	1,3962634	0,00838914	-0,00838914	
5	1,74532925	0,00838914	-0,00838914	
6	2,0943951	0,00737728	-0,00737728	
7	2,44346095	0,00547562	-0,00547562	
8	2,7925268	0,00291352	-0,00291352	
9	3,14159265	1,0436E-18	-1,0436E-18	
10	3,4906585	-0,00291352	0,00291352	
11	3,83972435	-0,00547562	0,00547562	
12	4,1887902	-0,00737728	0,00737728	
13	4,53785606	-0,00838914	0,00838914	
14	4,88692191	-0,00838914	0,00838914	
15	5,23598776	-0,00737728	0,00737728	
16	5,58505361	-0,00547562	0,00547562	
17	5,93411946	-0,00291352	0,00291352	
18	6,28318531	-2,0873E-18	2,0873E-18	

Slide 2

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VET – Subject groups

Levels

| VET Subject 1 | VET Subject 2 |

BBS/VET - specific

| Informatics | Econmy, Business | Science |

BBS/VET- general

| German | English | Math |

General (with AHS)

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Visualisation of competence models mechanical engineering

Maschineningenieur

Wirtschaftsingenieur

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Standards and e-learning

Learning object
Learning object
Learning object
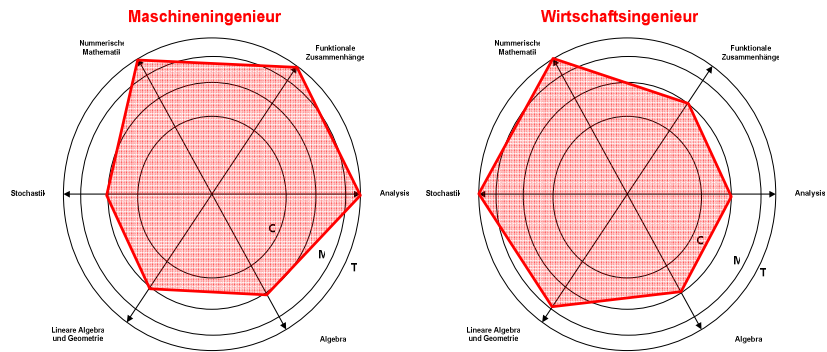
Le   Learning

elearning sequences=
learning units
+ didactic concept
+testing utility
+metadata (CMS)

learning module

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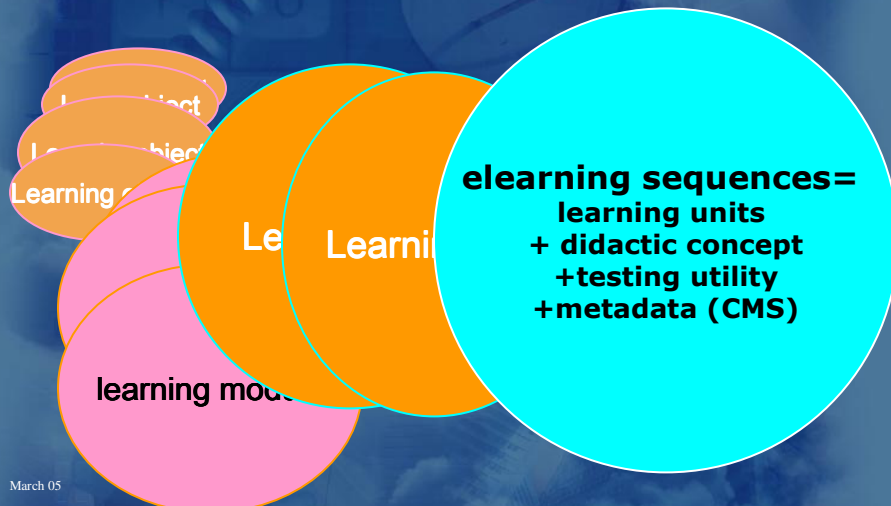
eLearning- sequences

1. Lasting 3-4 weeks of teaching/learning

2. Metadata: Classifikation after

   a. Portals of subjects:
      Subjects in primary schools; German; Languages; History; Geography; Philosophy und Psychology; Mathematics; Science (inklusive Medicine); Economy and Law; Sports; Arts und Creativity; Business and Accounting; Informatica und Office-management; Techology education; Others.

   b. Levels of Education :
      Elementary education (Volks- und Sonderschulen), Secundary education I (Hauptschule, AHS-Unterstufe, u. a.), Secundary education II (Vocational Education and training included), Post Secondary Education (Academies, Colleges or postsecondary courses)

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2. Information for Teachers
   Methods and didactic references, solutions of tasks, experi-ences and variation, modularity, teacheractivities and inter-ventions, learning organisation.

   a. Targets of teaching and learning

   b. Target groups, pre-knowledge of students needed

   c. Syllabus, work plan

3. Learning units structured in

   a. Beginning

   b. Material for theory phases/ Material of application phases

4. Tasks and exercises

5. Assessment

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elearning-objects and tasks

Tasks and examples of standards   and

e-learning objects
(f. i. worksheet, sketch with explaination, collection of links)
in a media format like **weblecture**,
interactive test, simulation,
webquest or others
must be combined in one concept.

Learning object (London LTRI):

www.londonmet.ac.uk/ltri/learningobjects/index.htm

vgl. Erlass: Elektronischer Content für Österreichs Schulen GZ 629/1-III/03 vom 22. August 2003
(www.bmbwk.gv.at → IT- Angebote → IT-Qualifikationen → Umgang mit neuen Medien)

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Highlights of e-learning projects in Austria

Christian Dorninger
ISSEP Klagenfurt, 30.3.05

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What is an e-learning school (e-education)

Every student (upper secondary) can test e-learning sequences in the next to years

All teachers should get experience with e-learning sequences in their subjects

Teams of teachers work on e-learning programmes (didactics, methods, content)

Good school experience in **regional networks**

Steering group of school partners must be established to support content development

Cluster schools are working in networks and offer **additional qualifications** (IT-certificates)

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School development – House of learning

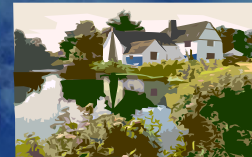**Only concrete pedagogical visions can bring about a fundamental change process, e.g.:**

◁ e-Education ("e-learning-school")

◁ Bilinguality (two languages at school for all)

School programme, change management

50% of syllabus made by school community

Global budgeting, specific learning assignments

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E-learning school clusters

Pick the winners and let them work together:

◁ About 50 schools in all Austrian provinces

◁ Exchange experience in different types

◁ Cooperation with unis and companies

◁ Reinvent "old" pedagogical concepts (Daltonplan, training firms, industry project)

◁ Regional clusters with local coordination

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Knowledge management at school

Knowledge maps

Knowledge-mapping can make know-how of people in any context visible.

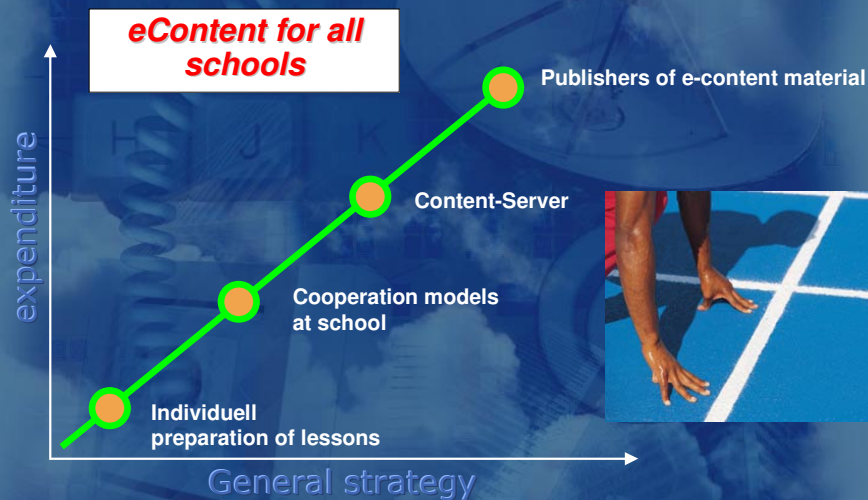| Knowledge-item Knowledge support	Knowledge item 1	Knowledge-item2	
Person 1			
Person 2			
Person 3			

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eContent Initiative tasks

◁ **Providing content for all subjects**

◁**Providing content for specific topics**

◁ **Needs for notebookPC classes**

◁ **Pathways of learning, worksheets**

◁ **Simulations and games**

◁ **Webquests,…**
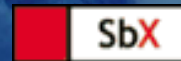
◁ Examinations and tests

◁ Copyright regulations !

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eContent for all schools

Publishers of e-content material

Content-Server

Cooperation models at school

Individuell preparation of lessons

expenditure
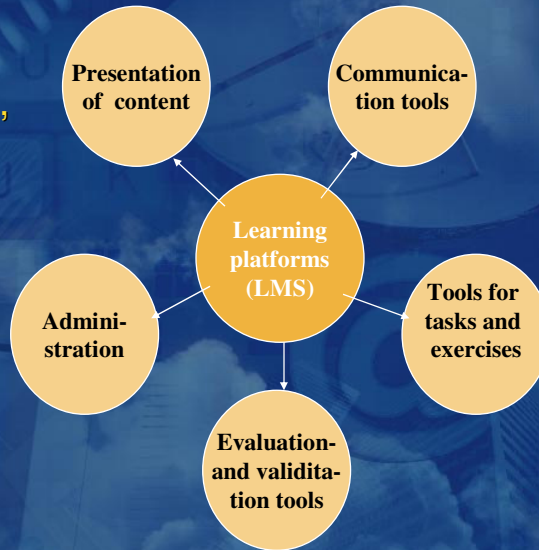
General strategy

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SbX as part of e-Content

◁ **SbX = School book eXtra: Webextension of normal school book in the internet**

◁ **PP-Partnership schoolbook publishers <–> education administration**

◁ **Free access: www.sbx.at / sbx.bildung.at**

◁ **About 100 titles in a year 2003-2006**

◁ **Used quite differently at schools**

◁ **SbX must be evaluated**

SbX

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Platforms (LMS, CMS, LCMS) oder individual learning tools (Mindmapping)

- Presentation of content
- Communication tools
- Learning platforms (LMS)
- Tools for tasks and exercises
- Evaluation- and validitation tools
- Administration

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Education standards in IT

LMS:

Tools
Chat
Messaging
Notes
Discussion Forums
Progress Tracking
Search
Multilinguality
Library, Glossary
Statistics Reports
...

HYPERWAVE
*e*Learning Suite

Rooms
Studyroom
Courseroom
Café
Administration
Foyer

Roles
Trainees (->*Profiles*)
Trainers & Tutors
Authors
Administrators

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School homepage Award

2500 Schoolhomepage in Austria

Criteria for good homepages:

- ✓ School profile (design, ….)
- ✓ Events, datebook, supplierung (?)
- ✓ E-Mail-Address for all teachers/students
- ✓ Chronicle
- ✓ Virtual classrooms

Quality Awards for Schulhomepages

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IT - Competitions

◁ Jugendinformatik-Wettbewerb der OCG –
3 categories according to grade 4, 8 and 12 –
programming, websites, projects

◁ Internetwettbewerb Cyberschool -4 categories
junior, classic, technics, Girls only; webpage-
design, games, e-learning

◁ L@rnie-Award 2004 eContent competitions for
teachers and teacher-student teams, 6 categories

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Studies of learning in notebook-classes

- ▷ High satisfaction of students with e-learning environment
- ▷ High teacher agreement and abilities
- ▷ NotebookPC-class students are better in organisation of learning
- ▷ Students are better problem solvers and text-editors
- ▷ Negative consequences (lack of concentration, internet addicts, worse grades) could not be found

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Output results of notebook-studies

Competences of NotebookPC- students

- √ information management is good
- √ teamwork is sometimes better
- ↗ self-organisation is significantly better
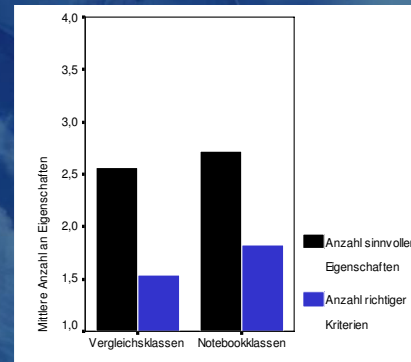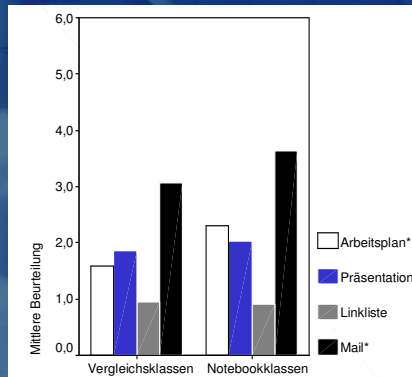- ↗ motivation is significantly better

Side effects and risks:

- ↗ low concentration on subject area learning – proved false
- ↗ PCs/Internet addiction - proved false
- ↗ low achievement in other subjects – proved false

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Information management and teamwork of students

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Critical Success factors

1) e-learning school clusters (structure with selforganisation and benchmarking)

http://www.schule.at/elc-community

http://e-lisa.at/notebook-klassen

2) Content(server) with material (critical mass)

"Schulbuchextra": http://sbx.bildung.at

"Mathe-online": http://www.mathe-online.at

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Education standards in IT

Entrance to lifelong learning

▷ **e-learning approaches are a vehicle to use permanent classroom external information ressources**

▷ **e-learning empowers students to communicate with (often anonymous) experts worldwide**

▷ **e-learning skills certified as in business and industry**

▷ **e-learning allows individual learning pathways**

▷ **e-learning supports own learning environments**

-> therefore it supports lifelong learning

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