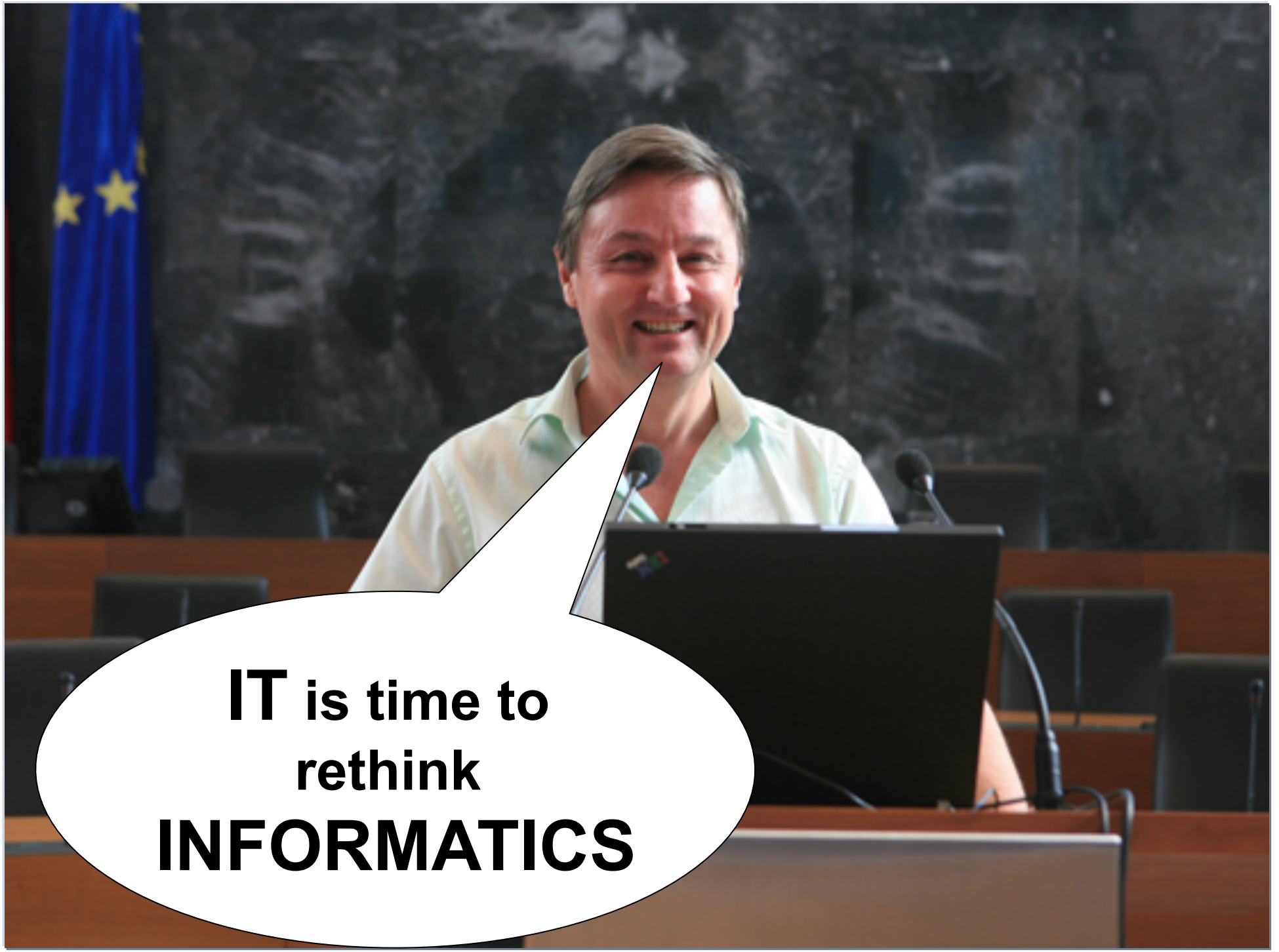
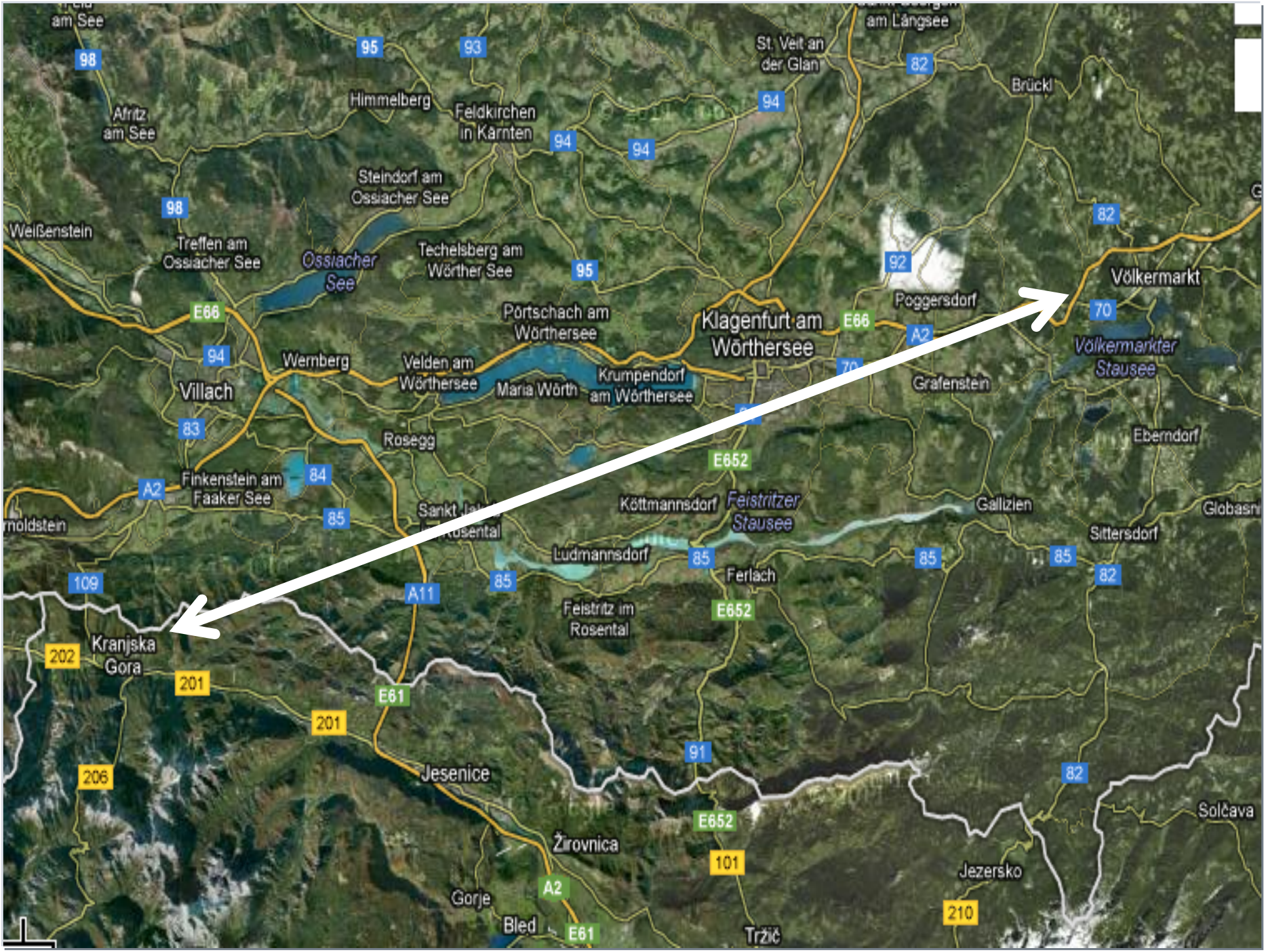

IT is time to
rethink
INFORMATICS

My first international conference
IFIP, Dortmund, Germany, 2002

ALPEN-ADRIA UNIVERSITÄT
KLAGENFURT | WIEN GRAZ

A Competence-Oriented Approach to Informatics Education in Austria

Peter Micheuz
Gymnasium Völkermarkt, University Klagenfurt


Afritz am See
Himmelberg
Feldkirchen in Kärnten
St. Veit an der Glan
Brückl
Steindorf am Ossiacher See
Weißenstein
Treffen am Ossiacher See
Ossiacher See
Techelsberg am Wörther See
Pörtschach am Wörthersee
Klagenfurt am Wörthersee
Poggersdorf
Völkermarkt
Völkermarkter Stausee
Wernberg
Velden am Wörthersee
Maria Wörth
Krumpendorf am Wörthersee
Villach
Grafenstein
Rosegg
Eberndorf
Finkenstein am Faaker See
Köttmannsdorf
Feistritzer Stausee
Gallizien
Sittersdorf
Ludmannsdorf
Ferlach
Feistritz im Rosental
Kranjska Gora
Jesenice
Žirovnica
Jezersko
Solčava
Gorje
Bled
Tržič

ISSEP 2005

30.3. - 1.4.

University Klagenfurt / Austria

Informatics in Secondary Schools - Evolution and Perspectives

- Home
- About
- Location
- Programme short
- Programme long
- Tutorials
- Lecture slides
- Pictures
- Committee
- Local comittee
- Imprint

Proceedings to be ordered
office(at)amedia.at

INFORMATICS in SECONDARY SCHOOLS

Evolution and Perspectives

Wed, March 30th - Fri, April 1st 2005

Dear visitor! The conference is over.
We thank for Your interest and the positive feedback.
Pictures and lecture slides are online.

FINAL PROGRAMME
[for Austrian teachers: Erlass des BMBWK]

You can download a conference booklet for offline viewing (PDF, 700kB) here

The ISSEP conference took place from March 30th '05 - Apr 1st '05.
in Klagenfurt, Austria, hosted by the University of Klagenfurt.

It was organized by the Department of Informatics-Systems (ISYS)
Universitätsstrasse 65, A-9020 Klagenfurt
issep@isys.uni-klu.ac.at
University of Klagenfurt

2005: Need for a framework

- The digital gap in this type of school between the pupils/students is unacceptably wide
- There is a need for a reasonable framework which ensures a certain level of E**-Literacy**
- Students leaving lower secondary level should prove a „reasonable standard of **Informatics Competence**
- **Concretion of the curriculum** in the grade 9 is of high concern

2005: Conclusions

- The situation/role/importance of ICT/Informatics **differs extremely from school to school** – due to autonomy,
  as well as the IT-knowledge and **informatics competences** of the pupils/students!

- **Standardizing measures** especially **up to** and especially for grade 9 (end of compulsory education) should be taken

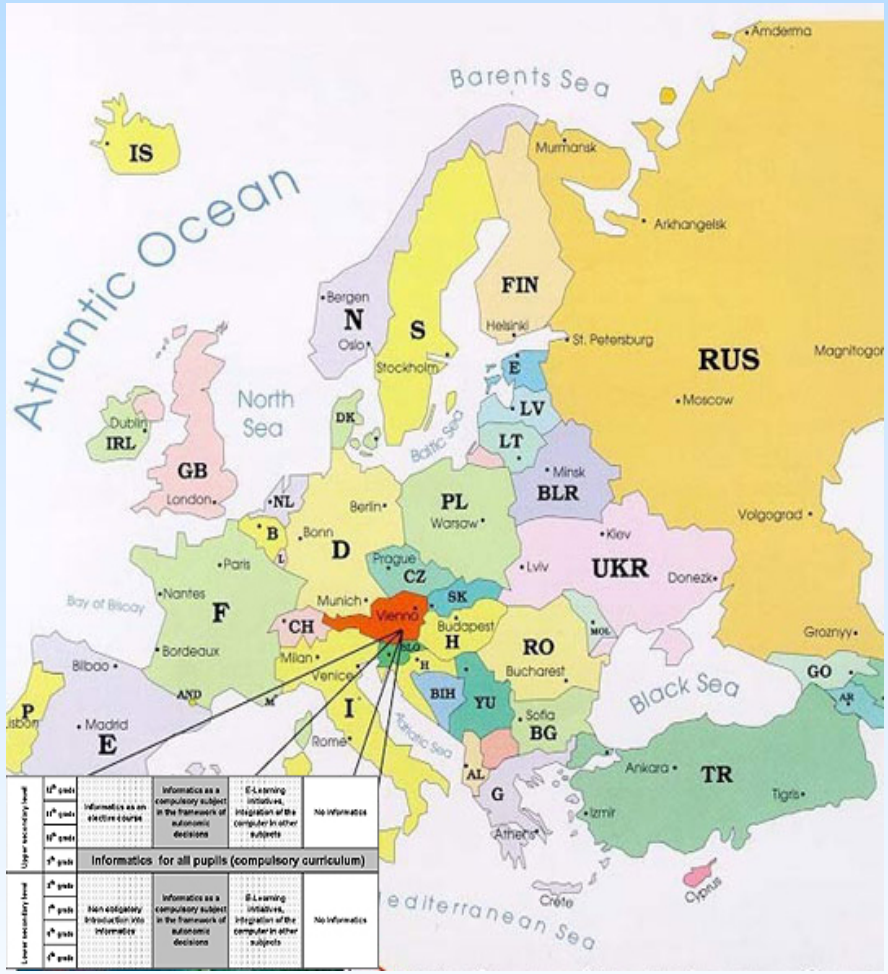
- I suggest the **simplification of the terminology** in the context of **ICT** and **Informatics**.
  (Actually, Mathematics in schools covers the range from primitive calculating to abstract proving …)

  Why shouldn‘t the subject **„Informatics“** stand for elementary **ICT-Competences** as well as for „**Real (Pure) Informatics**“?

Former Talks at ISSEP conferences

- **2005 Klagenfurt, Austria**
  20 Years of Computers and Informatics in Austrian Secondary Academic Schools
- **2005 Klagenfurt, Austria**
  The Role of ICT and Informatics in Austria's Secondary Academic Schools
- **2006 Vilnius, Lithuania**
  Informatics Education at Austria's Lower Secondary Schools between Autonomy and Standards
- **2008 Torun, Poland**
  Harmonization of Informatics Education
- **2010 Zurich, Switzerland**
  Reflections on Software Tools in Informatics Teaching

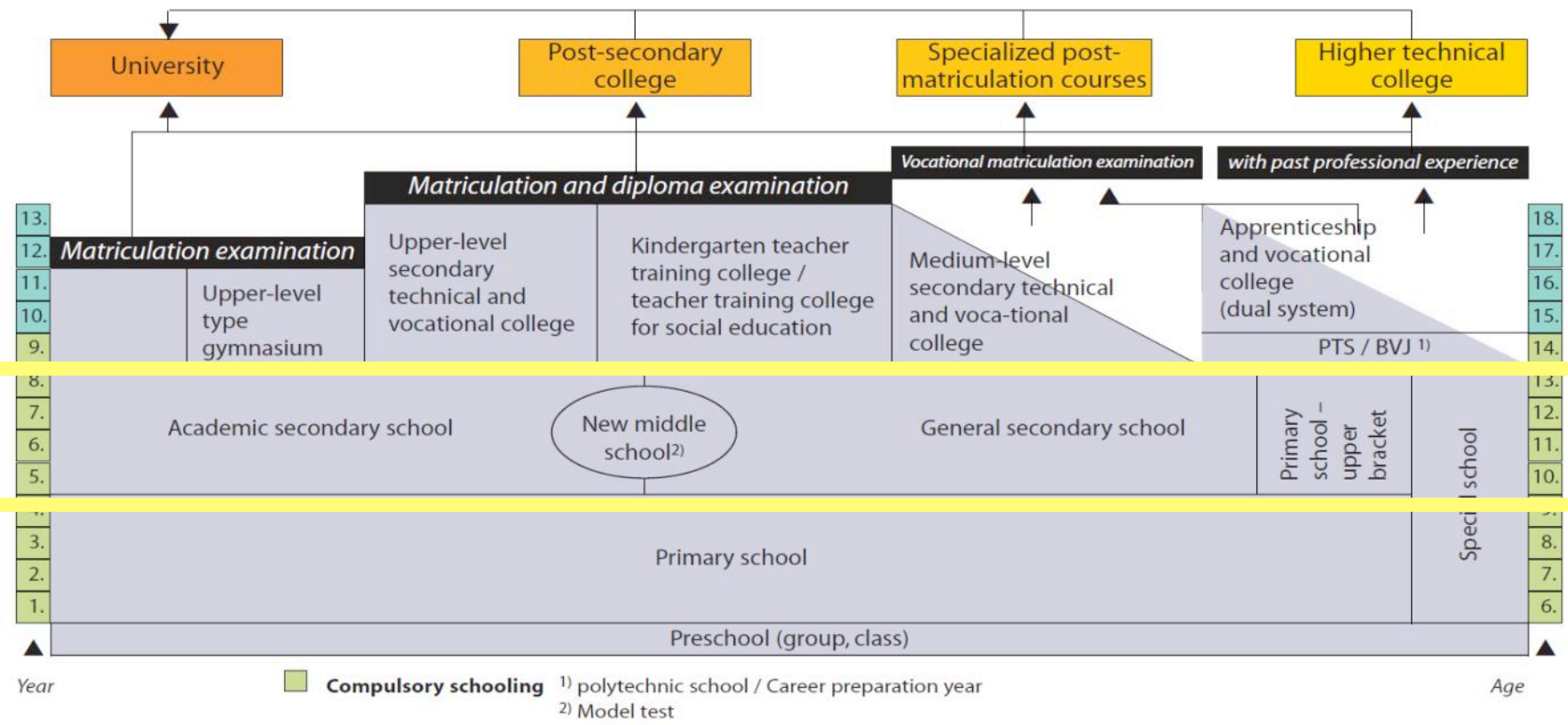
An European view



The digital landscape of schools all over Europe is very inhomogenious and different …

**In 17 countries there is a common currency (EURO) …,
but no common understanding at all about ICT/Informatics Education at lower secondary level!**

The Austrian School System



380.000 of about 1.200.000 pupils/students in Austria in Lower Secondary Education

Results of the autonomy

Upper secondary level	12th grade	Informatics as an elective course	Informatics as a compulsory subject in the framework of autonomic decisions	E-Learning initiatives, integration of the computer in other subjects	No informatics
	11th grade				
	10th grade				
	9th grade	**Informatics for all pupils (compulsory curriculum)**			
Lower secondary level	8th grade	Non obligatory Introduction into Informatics	Informatics as a compulsory subject in the framework of autonomic decisions	E-Learning initiatives, integration of the computer in other subjects	No Informatics
	7th grade				
	6th grade				
	5th grade				

ICT – Informatics – computer science

Can these assignments help us?

ICT ⇔ **instruction, training, practical, applying software, skills and competencies**

Informatics ⇔ **general education, e-literacy, theoretical, developing and understanding software**

Technology:
The study of or a collection of techniques (Wikipedia!)

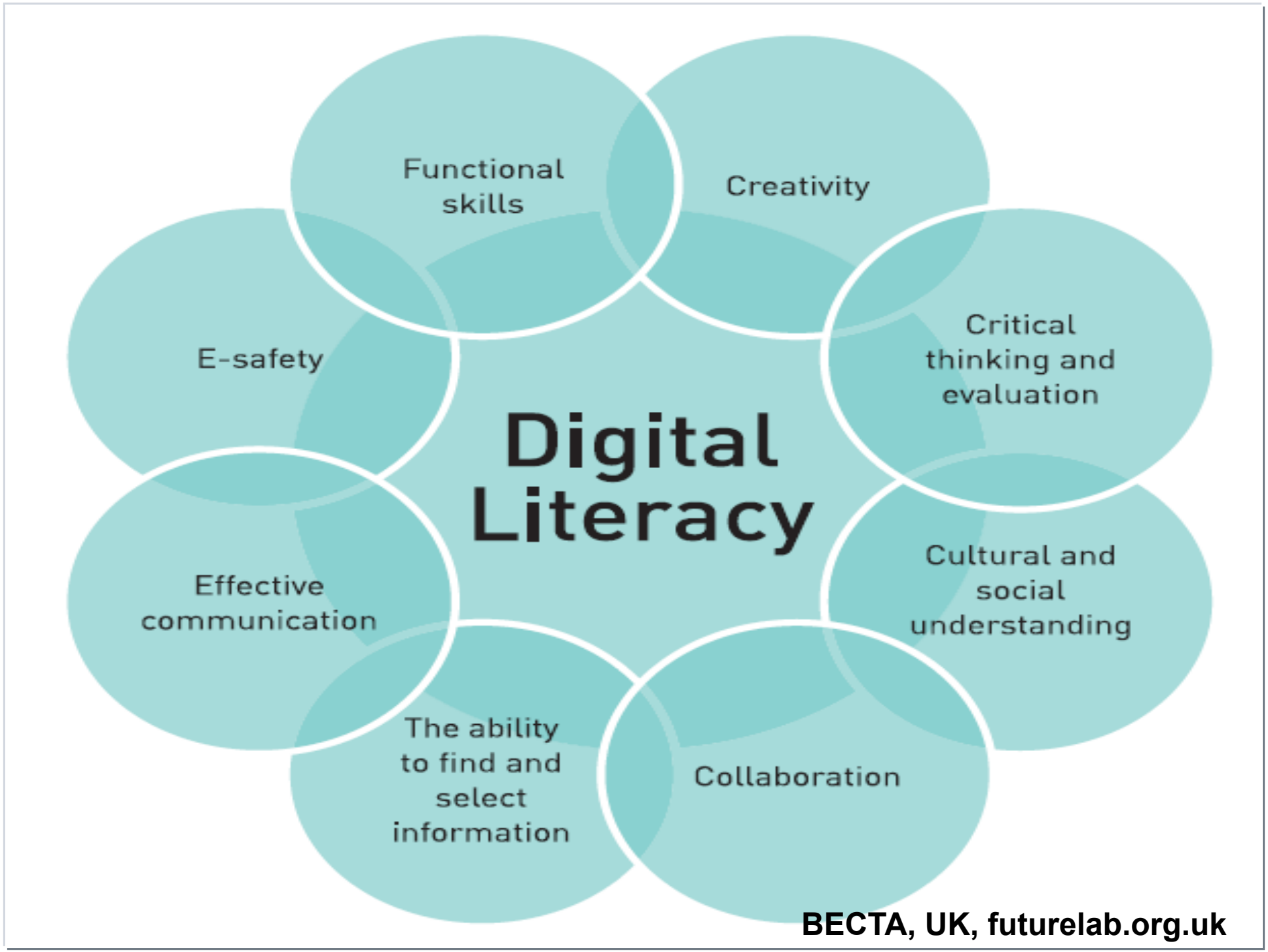
The words ***informatique*** in French and ***Informatik*** in German do **not** mean the same as ***informatics***.

Rather, they are much closer to **computer science**.

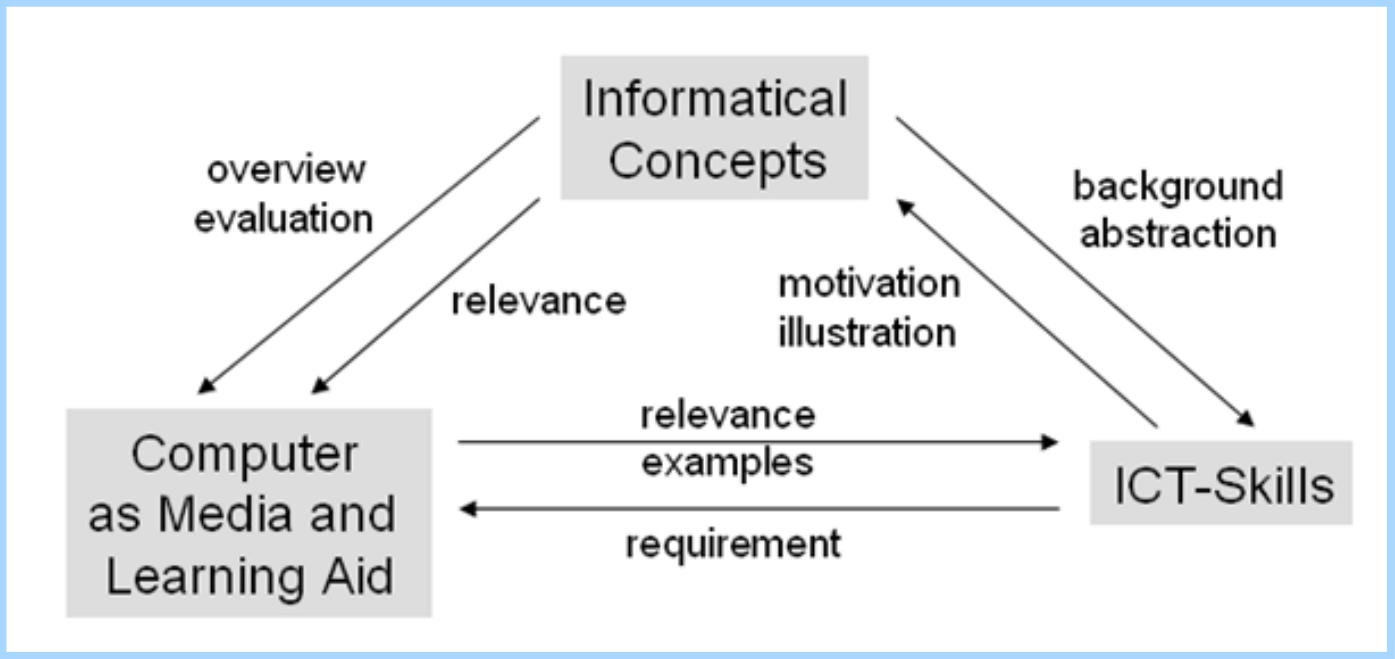
Fuzzy Terminology

Prefix	Levels
Digital, Media Computer, E (Electronic) IT, ICT, Informatics	**Skills, Literacy, Fitness Fluency, Knowledge, Qualification Competence, Pedagogy Education**

Qualification
Media Literacy
Computer
Fitness
Education
ICT Competence
Knowledge
IT Fluency
Informatics
E- Pedagogy
Digital Skills


Digital Literacy
Functional skills
Creativity
E-safety
Critical thinking and evaluation
Effective communication
Cultural and social understanding
The ability to find and select information
Collaboration
BECTA, UK, futurelab.org.uk

Synthesis of Informatics Education



Synthesis of Informatics Education (Hubwieser 2003)

Computers are

- **objects of didactical reflection (Informatics),**
- **tools for filing, organising and presenting digital information (ICT),**
- **media for learning and teaching (E-Learning).**

Facts beyond theoretical considerations

Facts:

The subject „**Informatics**“ exists and has been established in the Gymnasium-Oberstufe since 1985 (obligatory and as elective course, centralized curriculum)

Since 1990 offered in grades 7 and 8 (13/14 years) electively

This shift of imparting „digital literacy“ from upper secondary level to the lower secondary level is necessary.

School autonomy since 1995 lead to many school profiles, where ICT/Informatics plays an important role.

Legitimation of the subject Informatics?

Recent report from Austria‘s Ministry of Education

- Autonomy of schools to alter timetables and introduce new subjects
- New curricula
- **Change from input orientation to measuring output**
- Establishment of educational standards (Math, Languages)
- Offering support of the **ECDL** (and other IT-certificates)

Legitimation of the subject Informatics

Deriving the necessity and **legitimation**
for an i**ndependant** subject Informatics at schools

Efforts in Germany:

- Schwill (Fundamental Ideas)
- GI-Recommendations 2000, 2004, ….
- Breier, Hubwieser, Friedrich, Schubert, Humbert, …

Pragmatical approach in Austria:

- Little central controlling at the expense of autonomy of schools
- Competition among school(types) in aquiring pupils/students by means of a reinforced offer of **Informatics** and **later** upcoming **ICT** ⇨ Is ICT replacing Informatics?

Informatics as a generic term?

Autonomy in Austria does not lead only to school specific timetables and curricula, but also to various terms for almost the **same** subjects and even contents!

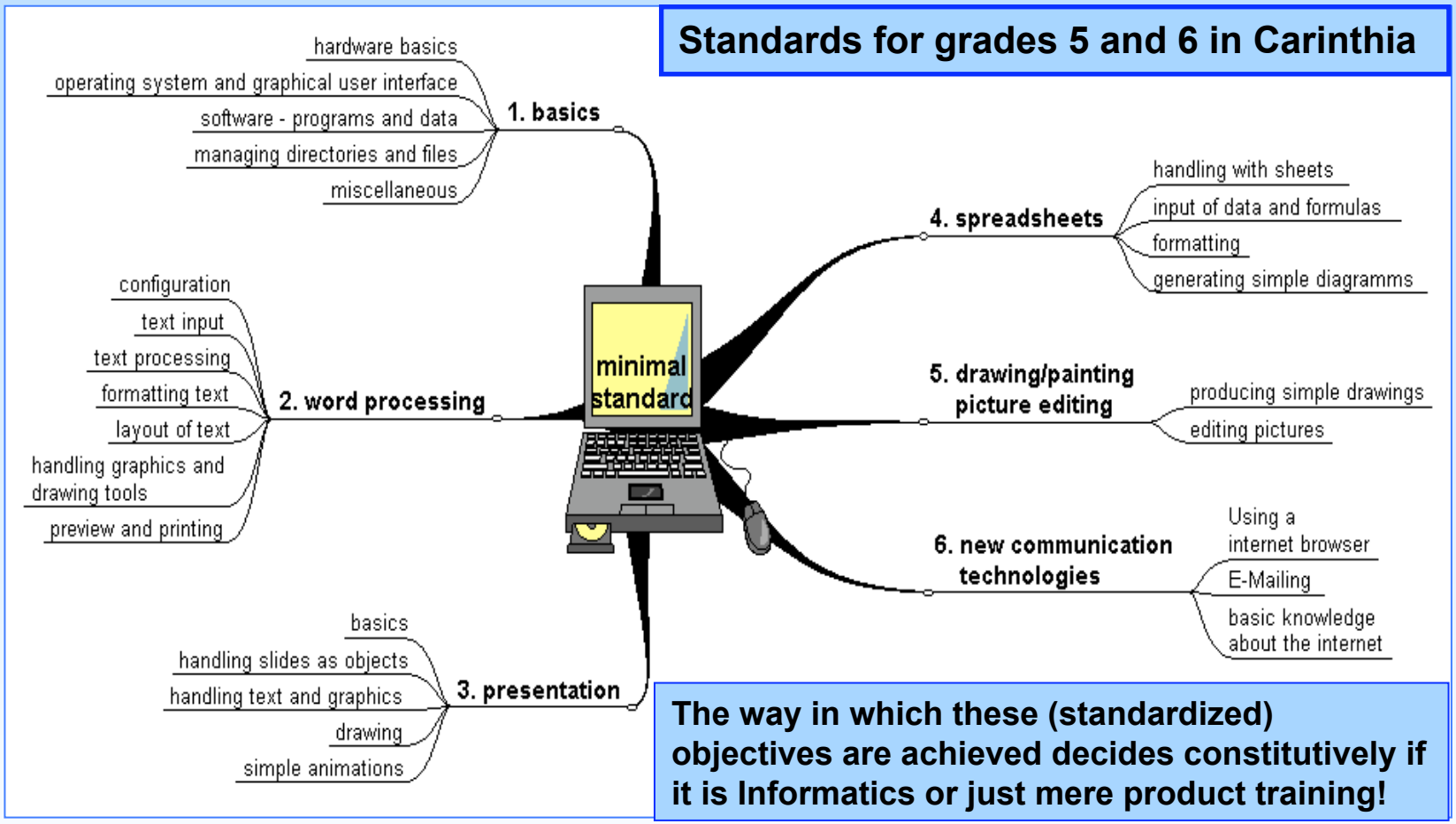
IT, ICT, Introduction into Informatics, Basic Education in Informatics
or even word processing ⇨ **Suggestion: generic term: „Informatics“**

Hubwieser: „Unfortunately the term Informatics is misused for every activity with the computer. The spectrum reaches from a computer aided video course to elementary typewriting“

Bavaria: Central curriculum for all pupils in the „Gymnasium“
beginning in the grades 6 and 7 in „Gymnasium“
(one hour a week),
Six content areas:
Graphics (OO-principle), Editing Text, File Systems, Communication by E-Mail, Hypertext-Structures, First Steps in Programming (Algorithms, Robots)

Informatics as a generic term?

Is this „Informatics“?



On the Way to a General Framework

… for general educating schools
(lower secondary and upper non-vocational education)

Refining the „Final Exam“ Competence Oriented

Upper secondary level	12th grade	Informatics as an elective course	Informatics as a compulsory subject in the framework of autonomic decisions	E-Learning initiatives, integration of the computer in other subjects	No informatics
	11th grade				
	10th grade				
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	7th grade				
	6th grade				
	5th grade				

Substance and Structure Reference Model

How many students do we expect to choose Informatics as an elective course?

Important „sandwich“ subject!

Defining Educational Standards

Normalizing effect

INFORMATION AND COMMUNICATION TECHNOLOGY IN SECONDARY EDUCATION

A Curriculum for Schools

Original 1994 version produced by:

Ulrich Bosler, Germany
Sam Gumbo, Zimbabwe
Harriet Taylor, USA
Zoraini Wati Abas, Malaysia

Charles Duchâteau, [illegible]
Raymond Mo[illegible]
Peter W[illegible]

Chair & Joint [illegible] [illegible]therlands
Jo[illegible] [illegible] Kingdom

GOOD AND/OR OLD?

[illegible]sion produced by:

Yvonne Buettner, Switzerland
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Charles Duchâteau, Belgium
Pieter Hogenbirk, The Netherlands
Raymond Morel, Switzerland

Chair & Joint Editor: Tom van Weert, The Netherlands

The Chair of the Working Party wishes to thank the Centre Pédagogique des Technologies de l'Information et de la Communication (CPTIC), Geneva, Switzerland and its Director Raymond Morel for their continuing support.

The Chair of the Working Party also acknowledges the support from the Swiss Academy of Engineering Sciences (SATW)

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November 2000

The current version of the curriculum is for the moment only in english, but you can find here the original 1994 version in french, spanish and portuguese.

Terminology

Informatics (Computing Science)

The science dealing with the design, realization, evaluation, use and maintenance of information processing systems; including hardware, software, organizational and human aspects, and the industrial, commercial, governmental and political implications (UNESCO/IBI).

Informatics Technology

The technological applications (artefacts) of informatics in society.

Information and Communication Technology (ICT)

The combination of informatics technology with other, related technologies, specifically communication technology.

In this document these definitions have been collapsed into one, all encompassing, definition of Information and Communication Technology

ICT

This implies that ICT will be used, applied and integrated in activities of working and learning on the basis of conceptual understanding and methods of informatics.

Student Curriculum

A. ICT Literacy (Appendix A)
B. Application of ICT in Subject Areas (Appendix B)
C. Integration of ICT across the Curriculum (Appendix C)
D. ICT Specialisation (Appendix D)

B. Application of ICT in Subject Areas (Appendix B)
Contents

ICT in Languages
ICT in Natural Sciences
ICT in Mathematics
ICT in Social Sciences
ICT in Art
B1 Measurement
B2 Modelling and Simulation
B3 Robots and Feedback Devices
B4 Statistics
B5 Creating Graphics
B6 Music
E1 Spreadsheet Design
E2 Database design

Appendix C Integration of ICT across the Curriculum

Below you find a selection helping you to plan your own project. The examples illustrate the use of ICT in different subjects referring to different modules described previously.

«Outside Back Cover» – an Encouragement to Reading
«you become what you eat» goes the saying... are we becoming genetically modified ?
«Antarctica 2000»
«Mutlimédia et Langues»
«The Parking Garage Problem»
«The 1920's and It's Excesses»
«Le Village Prologue»
«Society's Problems»

A. ICT Literacy

Contents

A1* Basic Concepts of ICT
A2 Using the Computer and Managing Files
A3 Word Processing
A4 Working with a Spreadsheet
A5 Working with a Database
A6 Composing Documents and Presentations
A7 Information and Communication
A8 Social and Ethical Issues
A9 Jobs and/with ICT

* This module could be integrated with other core modules.

D. ICT Specialisation (Appendix D)

Topics include: basic and advancing programming, planning information systems, designing process control systems, and project management.
Contents

Specialisation Preparation Module

SP1 Introduction to Programming

SP2 Top-Down Program Design

General Specialisation Module

GS1 Foundations of Programming and Software Development

GS2 Advanced Elements of Programming

Vocational Specialisation Module

VS1 Business Information Systems

VS2 Process Control Systems

VS3 Project Management

Curriculum (and competencies)

ONE OF BENTO GONCALVEZ RECOMMENDATIONS, 2009

Education and technology for a better world requires the continuing renewal of the ICT curriculum alongside informatics and computer science. Informatics and the pedagogy of informatics teaching help with the learners' creativity with abilities in many domains. Digital literacy complements informatics with differing curriculum and competencies with many teachers requiring clearer standards for both. The curriculum should include the history of computing to widen the learners' understanding of computing, its recent timeline and rapidly changing impacts.

"We should try to produce standards in digital literacy which could be used as recommendations for all (initial) teacher training in universities."

"To compose an international group of educators to (re)define the core aims of the curriculum of informatics and computer science – the subject has changed, the students have changed, education has changed since UNESCO and other comparable institutions established the standard content."

FITness program (2000, US),

competence founded on three pillars

Contemporary skills

the ability to use various computer applications

Foundational concepts

the basic principles and concepts of computing
that form the basis of computer science

Intellectual capabilities

the ability to apply information technology
in particular situations and to use this technology
to solve new problems

ACM Curriculum 2003, Lower Secondary Education, K8

Computers and software applications

[as knowledge of the computing environment]

- **Parts of a personal computer**
- **Standard software**
- **Operating systems**
- **Networks**
- **World Wide Web and E-Mail**

Problem solving with computer science

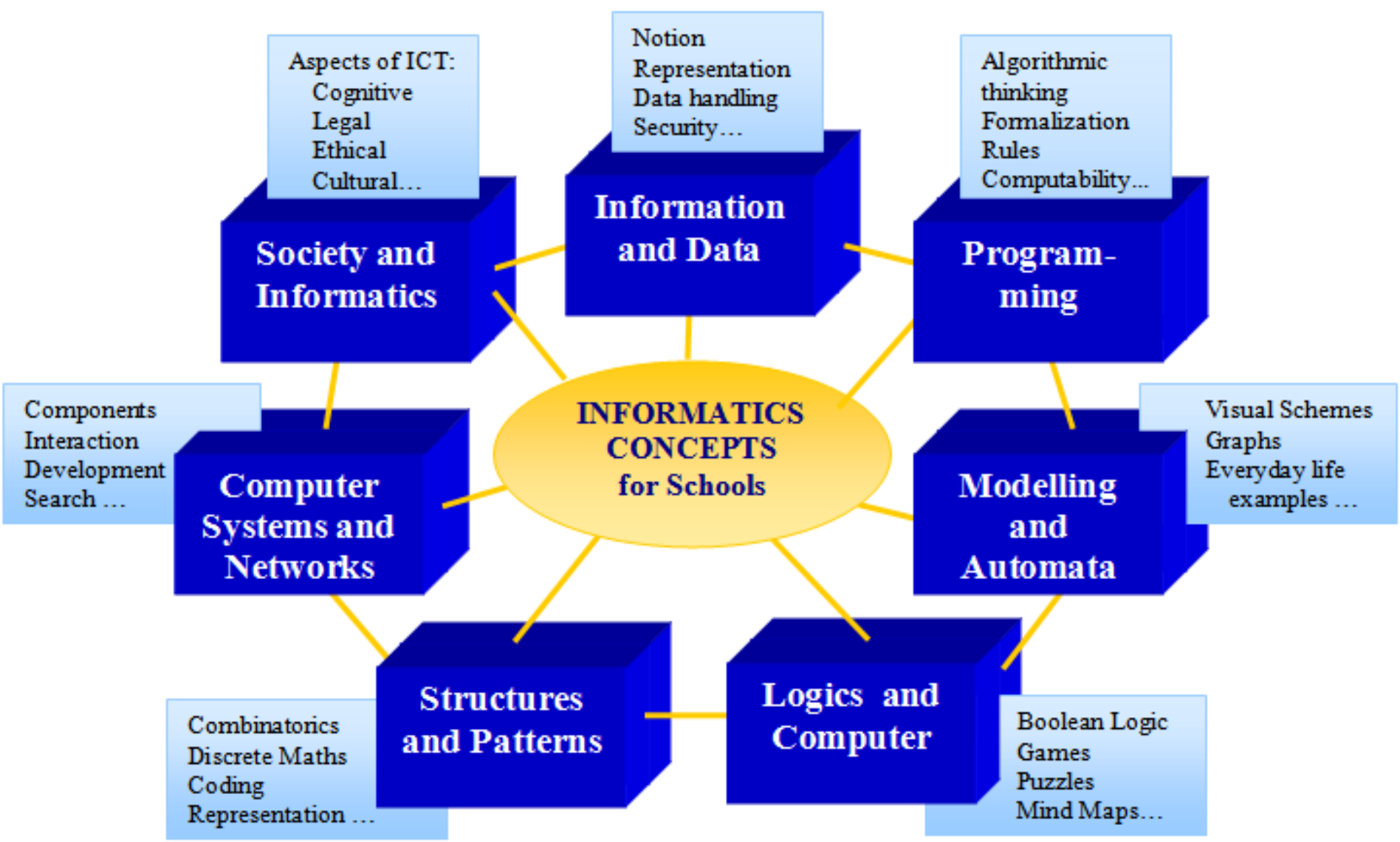
[as a way of thinking that uses computers as a creative medium for solving problems of all kinds]

- **Representing information digitally**
- **Problem solving and algorithms**
- **Computer programming**

Social context of computing

[as an appreciation for the complex and changing interactions between computing, individuals, organizations, and culture]

- **Privacy and security**
- **evaluating and using information from networked sources**
- **human-computer interaction**
- **computers in society**



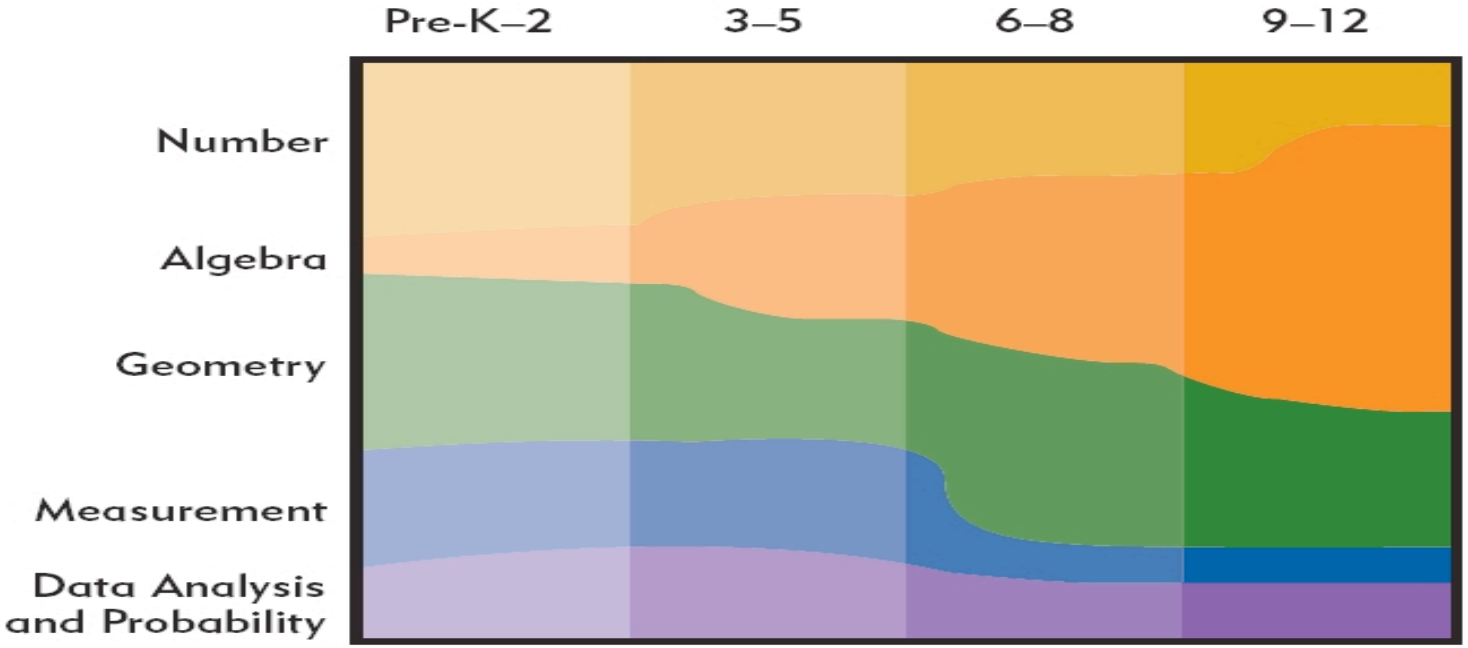
Summarized key informatics concepts for schools (Dagiene,2011)

US: Computing Education in 17 areas:

Software design | Hardware design | Creation of digital artifacts | Abstraction | Logic | Algorithm development and implementation | Programming paradigms and languages | Theoretical foundations | Networks | Graphics | Databases and information retrieval | Information security and privacy | Artificial intelligence | The relationship between computing and mathematics | The limits of computation | Applications in information technology and information systems | The social impacts of computing.

CSEA, 2011, Computer Science Education Act
http://polis.house.gov/Bill_Text_-_Computer_Science_Education_Act.pdf

The NCTM Standards for Mathematics



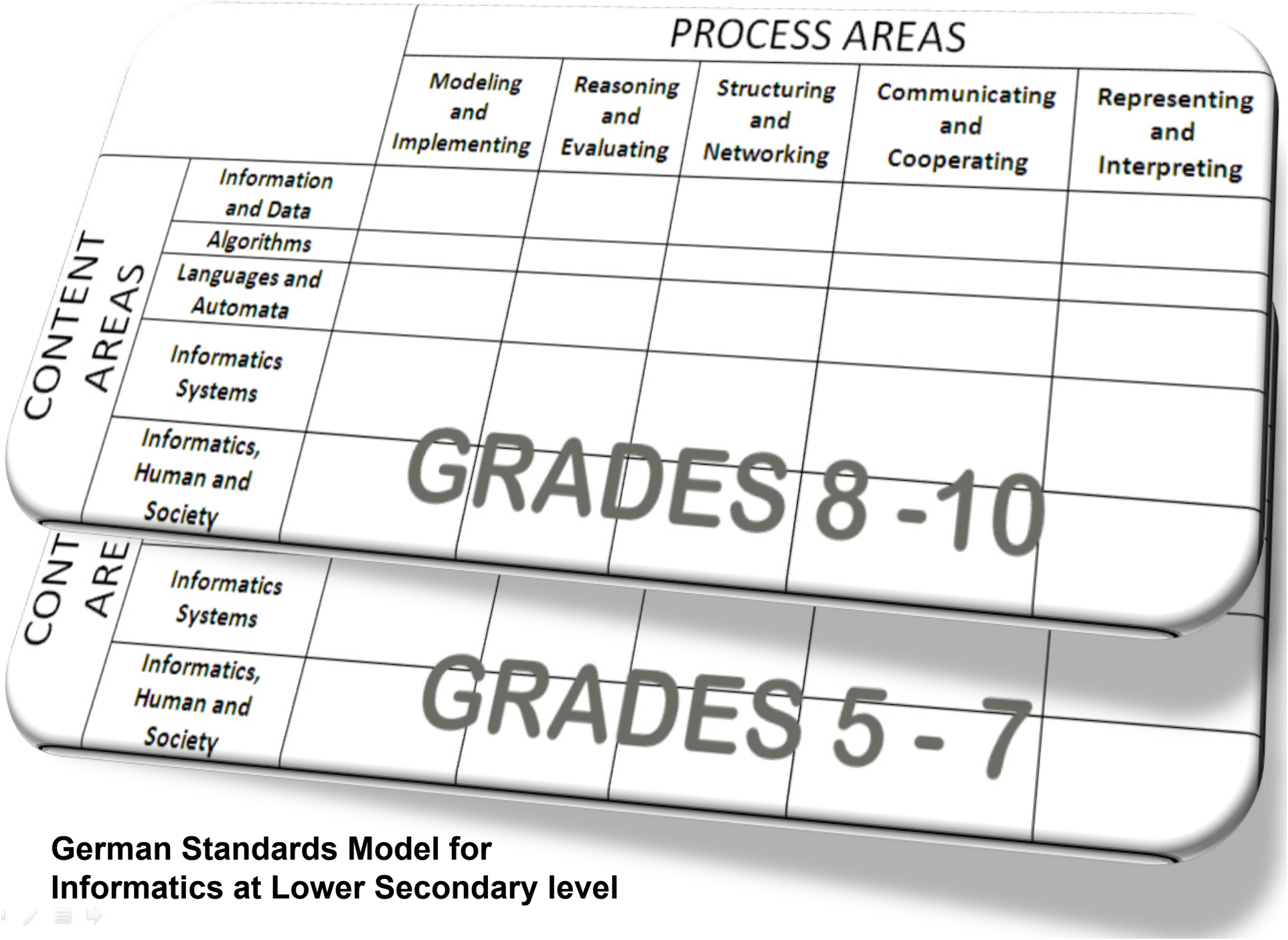
The Content Standards should receive different emphases across the grade bands.

plus Process Standards

- **Problem solving**
- **Reasoning and Proof**
- **Communication**
- **Connections**
- **Representations**

Table 1. Comparison/Analogy NCTM-Standard - German Informatics Standard

Mathematics (NCTM)	Informatics (German Group)
Content Standards	
Number and Operations	Information and Data
Algebra	Algorithms
Geometry	Languages and FiniteAutomata
Measurement	Informatics Systems
Data Analysis and Probability	Informatics, Humans and Society
Process Standards	
Problem Solving	Modelling and Implementing
Reasoning and Proof	Reasoning and Evaluating
Communication	Structuring and Networking
Connections	Communicating and Cooperating
Representation	Representing and Interpreting



German Standards Model for Informatics at Lower Secondary level

European Commision‘s Key Competences

- **Communication in the mother tongue**
- **Communication in foreign language**
- **Mathematical competence and basic competences in science and technology**
- **Digital competence**
- **Learning to learn**
- **Social and civic competences**
- **Sense of initiative and entrepreneurship**
- **Cultural awareness and expression**

Source: http://ec.europa.eu/dgs/education_culture/publ/pdf/ll-learning/keycomp_en.pdf

Current Timetable of Subjects in Austria

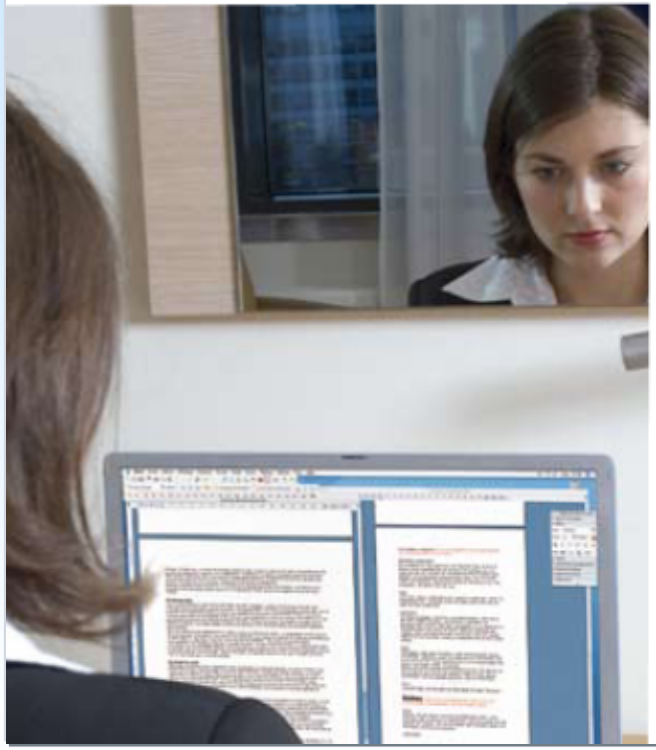
Subject	Grade 5	Grade 6	Grade 7	Grade 8	**Scope**
Religion	**2**	**2**	**2**	**2**	**8**
German	~4	~4	~4	~3	14-21
English	~4	~4	~3	~3	12-18
Foreign Languages			(~3-4)	(~3-4)	?
History and Social Studies		~2	~2	~2	5-10
Geography and Economy	~2	~1	~2	~2	7-12
Mathematics	4	4	4	~4	13-20
Geometric Drawing				~2	2-5
Biology	~2	~2	~1	~2	7-12
Chemistry				~2	2-4
Physics		~1	~2	~2	5-9
Musical Education	~2	~2	~2	~1	6-11
Art Education	~2	~2	~2		7-12
Textile and Technical Handicrafts	~2	~1	~1	~2	3-6
Activities and Sports	~4	~4	~3	~3	13-19
Room for new subjects as Informatics / ICT	**0-2**	**0-2**	**0-2**	**0-2**	**0-8**
Total hours per week	26-30	29-32	29-33	29-33	**120**

Table 1: Current norm-timetable and scope of hours at lower secondary level

Digital Competence

Definition:

Digital competence involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet.



Essential knowledge, skills and attitudes related to this competence:

Digital competence requires a sound understanding and **knowledge** of the nature, role and opportunities of IST in everyday contexts: in personal and social life as well as at work. This includes main computer applications such as word processing, spreadsheets, databases, information storage and management, and an understanding of the opportunities and potential risks of the Internet and communication via electronic media (e-mail, network tools) for work, leisure, information sharing and collaborative networking, learning and research. Individuals should also understand how IST can support creativity and innovation, and be aware of issues around the validity and reliability of information available and of the legal and ethical principles involved in the interactive use of IST.

Skills needed include the ability to search, collect and process information and use it in a critical and systematic way, assessing relevance and distinguishing the real from the virtual while recognising the links. Individuals should have skills to use tools to produce, present and understand complex information and the ability to access, search and use Internet-based services. Individuals should also be able use IST to support critical thinking, creativity, and innovation.

http://www.informatische-grundbildung.com

Startseite
Vorbemerkungen
Das Referenzmodell
Unterrichtsbeispiele
Ähnliche Initiativen
Interessante Links
Publikationen / Studien
Institutionen / Netzwerke
Veranstaltungen
Rückmeldungen
Kontakt

Digitale Baustelle Sekundarstufe I

Wer hohe Türme bauen will, muss lange beim Fundament verweilen.
Anton Bruckner

An der Situation informatischer, informationstechnologischer und medienpädagogischer Bildung in der österreichischen Sekundarstufe I hat sich seit mehr als zehn Jahren wenig geändert. Im Lehrplan 2000 stiefmütterlich berücksichtigt und der Schulautonomie überlassen, stellt sie sich derzeit inhomogen, unübersichtlich und unkoordiniert dar.

Seit einiger Zeit ist die Welt eine andere, nämlich eine zunehmend digitale. Die SchülerInnen haben den Anspruch, auf diese spätestens in der Sekundarstufe I entsprechend vorbereitet zu werden. Bisher allerdings fehlt es im Bereich der 10-14 Jährigen an einem klaren nationalen Bildungsauftrag und an konkreten Lehrinhalten und Lernzielen für diese Altersgruppe.

Newsletter

E-Mail-Adresse

anmelden

Info: *Der Newsletter kann jederzeit abbestellt werden.*

Sonderheft BMUKK
Juni 2011

Classification Scheme for Austria's Lower Secondary Level (K8 – 14 years)

Framework of Reference for Digital Competences - Competence Matrix for Basic Informatics Education

		Basic Competencies Level I	Extended Competencies Level II	Special Competencies Level III
Media Reflexion Related Topics	**1. Information Technology, Human and Society**			
	1.1. Benefits and Risks	Basic reflection on using the computer and its impacts. Basic Knowledge of vocational, social and historical facts.	Founded risk assessment. Solid knowledge in related topics. Knowledge of vocational, social and historical contexts.	Foundational and coherent knowledge. Evaluation of using digital media.
	1.2. Privacy, Law and Responsibility			
	1.3. Historical and vocational aspects			
Media Knowledge	**2. Informatics Systems**			
	2.1. Hardware	Basic IT-knowlegde and practical skills on the level of operating systems.	Detailed IT-knowlegde, fluent rote skills and basic knowledge of re… in the context …	…knowledge …echnical terms. …derstanding of concepts and simple models. Evaluation of informatics systems. Advisory skills.
	2.2. Software, Operating System and Filemanagement			
	2.3. Networks			
Use and Production of Media	**3. Software Applications**			
	3.1. Documentation, Publication und Presentation	Basic knowledge a… to accomplish s… in the co…	Experienced use of application software. Solving of standard tasks in school and everyday live throug selection of appropriate application software.	Extended tool competence. Conceptual understanding of application software. Problem solving competence and dynamic capabilities.
	3.2. Calculation and Visualization			
	3.3. Information, Communication und Cooperation			
Principles and Computational Thinking	**4. Informatics Concepts**			
	4.1. Representation of Information	Basic knowledge of informatics terminology and elementary connections. Execution and description of simple instructions.	Basic conceptual understanding of human-machine communication. Simple modeling of algorithmic tasks and their implementation.	Foundational knowledge and basic understanding. Abstract thinking. Creative solutions for algorithmic problems.
	4.2. Data, Relations and Structures			
	4.3. Algorithms, Programming and Automatization			

FIRST APPROACH BEFORE MARCH 2011

		Competence Levels		
		Basic	Extended	Special
Media Reflexion Related Topics	**1. Information Technology, Human and Society**			
	1.1. Impact of IT in Society			
	1.2. Responsibility in Using IT			
	1.3. Privacy and Data Security			
	1.4. Developments and Vocational Perspectives			
Digital Media Knowledge	**2. Informatics Systems**			
	2.1. Technical Components and their Use			
	2.2. Design and Use of Personal Information Systems			
	2.3. Data Exchange in Networks			
	2.4. Human-Machine Interface			
Use and Production of Digital Media	**3. Software Applications**			
	3.1. Documentation, Publication und Presentation			
	3.2. Calculation and Visualization			
	3.3. Search, Selection and Organisation of Information			
	3.4. Communication and Cooperation			
Principles and Computational Thinking	**4. Informatics Concepts**			
	4.1. Representation of Information			
	4.2. Structuring of Data			
	4.3. Automatization of Instructions			
	4.4. Coordination and Controlling of Processes			

OK

about 70 „I can“ statements

3 Anwendungen

3.1 Dokumentation, Publikation und Präsentation

- Ich kann Texte zügig eingeben, diese formatieren, kopieren, einfügen, verschieben und löschen.
- Ich kann Texte überarbeiten und korrigieren.
- Ich kann Dokumente und Präsentationen unter Einbeziehung von Bildern, Grafiken und anderen Objekten gestalten.
- Ich kann digitale Texte, Bilder, Audio- und Videodaten in aktuellen Formaten mit verschiedenen Geräten und Anwendungen nutzen und gestalten.

3.2 Berechnung und Visualisierung

- Ich verstehe den grundlegenden Aufbau einer Tabelle
- Ich kann mit einer Tabellenkalkulation einfache Berechnungen durchführen und altersgemäße Aufgaben lösen.
- Ich kann Tabellen formatieren.
- Ich kann Zahlenreihen in geeigneten Diagrammen darstellen

4 Konzepte

4.1 Darstellung von Information

- Ich kann einige Informationen aus dem Alltag kodieren und dekodieren.

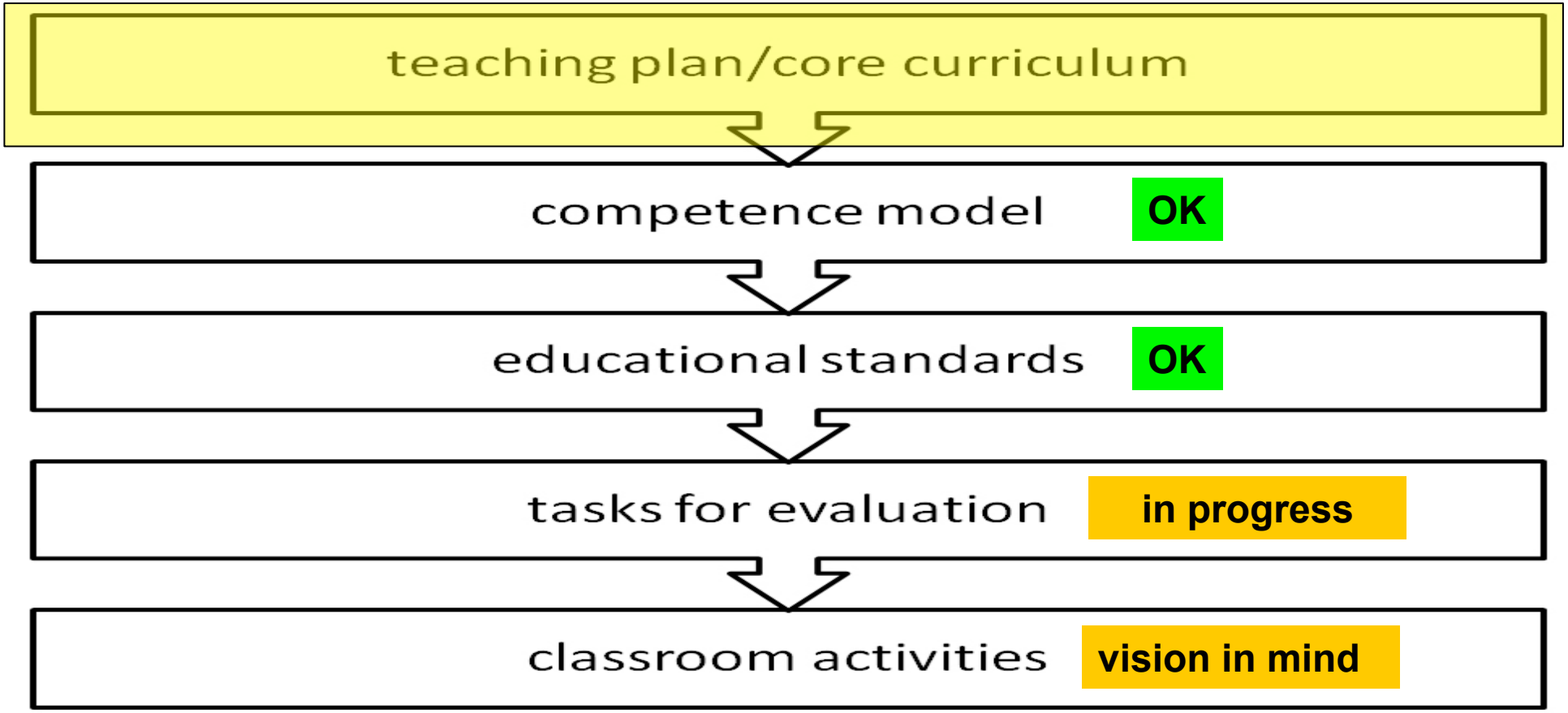
4.2 Strukturieren von Daten

- Ich kann mit Programmen Daten erfassen, speichern, ändern, sortieren, nach Daten suchen und diese selektieren.
- Ich weiß, dass es verschiedene Datentypen gibt (Ganzzahl, Gleitkommazahl, Text, Datum, Wahrheitswert), die bei der Verarbeitung beachtet werden müssen.
- Ich verstehe Ordnerstrukturen und kann eigene erstellen.
- Ich kann Tabellen in verschiedenen Anwendungen anlegen und ändern.

4.3 Automatisierung von Handlungsanweisungen

- Ich kann eindeutige Handlungsanleitungen (Algorithmen) nachvollziehen und ausführen.
- Ich kann einfache Handlungsanleitungen (Algorithmen) verbal und schriftlich formulieren.
- Ich kann einfache Algorithmen aus dem Alltag nennen und beschreiben.
- Ich kann einfache Programme in einer geeigneten Entwicklungsumgebung erstellen.

Process Model of Educational Standards



Future Work – „Lobbying?“

		DIMENSION OF ACTING (COMPETENCES)			
		Understanding	Applying	Analyzing	Developing
DIMENSION OF CONTENTS	Informatics Systems				
	Publication and Communication				
	Spreadsheets				
	Databases				
	Information Technology, Human and Society				
	Algorithms and Data Structures				

A Pragmatic (not sophisticated ...) Competence Model for Vocational Schools in Austria (grades 9-13)

On the Way to a General Framework

… for general educating schools
(lower secondary and upper non-vocational education)

Refining the „Final Exam“ Competence Oriented

Upper secondary level	12th grade	Informatics as an elective course	Informatics as a compulsory subject in the framework of autonomic decisions	E-Learning initiatives, integration of the computer in other subjects	No informatics
	11th grade				
	10th grade				
	9th grade	Informatics for all pupils (compulsory curriculum)			
Lower secondary level	8th grade	Non obligatory introduction into informatics	Informatics as a compulsory subject in the framework of autonomic decisions	E-Learning initiatives, integration of the computer in other subjects	No Informatics
	7th grade				
	6th grade				
	5th grade				

Substance and Structure Reference Model

How many students do we expect to choose Informatics as an elective course?

Important „sandwich“ subject!

Defining Educational Standards

Normalizing effect

Curriculum for grade 9

The students should be able to …

- **manage information and organize their learning themselves with suitable software**

- **convert existing sources of information and produce different information representations on the basis of previous knowledge**

- **use and systemize contents and structures as well as results and present multimedially their individual work**

- **handle standard software for written correspondence, for documentation, for the publication of work, for multimedia presentation as well as for commmunication**

Curriculum for grade 9

The students should be able to …

- use calculation models and evaluate and interprete the results and to use a simple data base

- to know substantial terms and methods of computer science and their typical mindsets, their historical development as well as their technical and theoretical basis

- get insight into the basic principles of automats, algorithms and programs

- know substantial measures and legal bases in connection with data security, data security and copyright

- to know about the effects of information technology on employment and the society

Curriculum Contents Grades 10-12, 2003

for the Optional Subject Informatics

- Basic Principles of Information processing
- Concepts of Operating Systems
- Structure and Functioning of Networks
- Databases
- Learning – and Working Organization (Knowledge Management)
- Concepts of Programming Languages
- Artificial Intelligence
- Extension of Theoretical and Technical Basics of Infromatics
- Basic Algorithms and Datastructures
- Informatics, Society and World of Work, Legal Issues

	Content	Levels of Competences		
		Knowing Understanding	Applying Designing	Reflecting Evaluating
Media Reflexion Related Topics	**Information Technology, Human and Society**			
	Impact of IT in Society			
	Responsibility in Using IT			
	Privacy and Data Security			
	Developments and Vocational Perspectives			
Digital Media Knowledge	**Informatics Systems**			
	Technical Components and their Use			
	Design and Use of Personal Information Systems			
	Data Exchange in Networks			
	Human-Machine Interface			
Use and Production of Digital Media	**Software Applications**			
	Documentation, Publication und Presentation			
	Calculation and Visualization			
	Search, Selection and Organisation of Information			
	Communication and Cooperation			
Principles and Computational Thinking	**Informatics Concepts**			
	Representation of Information			
	Structuring of Data			
	Automatization of Instructions			
	Coordination and Controlling of Processes			

Model for Digital Competence and Basic Informatics Education in Austria's Lower Secondary Level

	Content	Levels of Competences		
		Knowing Understanding	Applying Designing	Reflecting Evaluating
Media Reflexion Related Topics	**Information Technology, Human and Society**			
	Impact of IT in Society			
	Responsibility in Using IT Privacy and Data Security			
	History of Computing			
	Vocational Perspectives			
Digital Media Knowledge	**Informatics Systems**			
	Technical Basics and Functionalities			
	Operating Systems and Software			
	Networks			
	Human Computer Interaction			
Use and Creation of Digital Products	**Applied Informatics**			
	Production of Digital Artefacts			
	Calculation Models and Visualization			
	Search, Selection and Organisation of Information			
	Communication and Cooperation			
Principles and Software Developement	**Practical Informatics**	Trbobolja...		
	Concepts of Information Processing			
	Algorithms, Data Structures and Programming			
	Data Models and Databases			
	Intelligent Systems			

Competence Model for Informatics Education in Austria's Upper Secondary Level in General Education (Gymnasium)

IT is not forbidden
to use this abstract
frameworks and fill
them wITh concrete
INFORMATICS
tasks ...

... in želim vam veliko sreče in uspeha pri izvajanju
prevod Google …