Preparatory Knowledge: 
Propaedeutic in Informatics

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Motivation

- Informatics has developed extremely rapidly
- Numerous products, but their half-life diminishes dramatically
- In 1996 Dr. Smerdon pointed out the half-life of technical knowledge
  - of a mechanical engineer is 7.5 years,
  - five for electrical and
  - 2.5 for software engineers.

Therefore, a quest for basic principles in Informatics with long-term validity

- Fundamentals or „unchanging values“

- Should play an important part in the curricula of schools
Examples of fundamentals or „unchanging values“ in Informatics

→ Models/Modelling
  » Abstraction
  » States (reversible/irreversible)

→ Algorithm
  » Iterative/Recursive
  » Sequential/Parallel
  » Time Complexity
  » Decidability, Computability, NP complete problems

→ Syntax/Semantics
  » Information, Language, Alphabet

→ ...
Concrete examples
Based on 2 applets
First:

→ A balance
  » Model
  » Abstraction
  » States
  » Algorithm
  » Number systems
Fundamentals: Example

- Concrete examples
- Second:
  - A puzzle
    - Time Complexity
    - Decidability
    - Computability
    - NP complete problems

- More information about the applets and the whole electronic material of “Propaedeutic in Informatics” (available on a CD) can be found at http://welearn-lavista.fim.uni-linz.ac.at
• Just imagine a 5x5 puzzle
  ➔ Number the pieces from 1 to 25.
  ➔ Arrange all pieces in a sequence. We thus obtain all n! sequences of the n (= 25) numbers.
  ➔ For each resulting sequence, check whether it solves the puzzle.
  ➔ In the worst case it takes n! tries to find the correct sequence!

  ➔ If we omit the rotations and use a computer with a billion checks per second:
  ➔ Placing: 25! = 1·55*10^25 seconds, i.e. ~ 4·9*10^11 years.
  ➔ That is still 15 times as long as the time that has elapsed since the original big bang!
Propaedeutic in Informatics

- An introductory course for informatics students at the Johannes Kepler University Linz
- Blended Learning: lectures and phases of self-organized study alternate
- Electronic material was developed, also issued for use in secondary schools
The course Propaedeutic in Informatics

- Propaedeutic in Informatics
  - Electronic material
    - Study Guide: guidance for self-organized study, explanation of parts of the subject matter, presented in the form of a dialogue between youngsters, and aimed particularly at pupils in the final years of secondary education
    - The entire study material in the form of illustrated, partly interactive HTML pages
    - The study material in full as text, also available as printed lecture notes
    - The full set of transparencies for individual lectures
    - Self-assessment: exercises, sample examination paper, to enable students to check how far they have got and which parts of the subject matter they need to go over in more depth
    - Study applets, on the basis of which students can carry out experiments and simulations and thus penetrate the subject matter.

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Informatics has developed extremely rapidly. Numerous products, but their half-life diminishes dramatically. Purely product-related knowledge and skills are inadequate. Logical and necessary to concentrate on the basic concepts. New media and eLearning can help to present these „unchanging values“ more effectively.
Thank you for your attention
• OCG Forum E-Learning
  →  http://ocg-elearning.fim.uni-linz.ac.at

• Account:
  →  Login and Password: gast
  →  or email to loidl@fim.uni-linz.ac.at

• Idea: To draw the E-Learning map of Austria
  →  Projects/Activities
  →  People behind the projects/activities
  →  Exchange of ideas/Cooperation

• Next „physical“ meeting: ICL 2005 (28. – 30.9.) in Villach
  →  Special Session: Call for Contributions