The essence of a school

- "After you have forgotten everything you have learned in the school – what still remains – this is the essence"
  - Capabilities, not “facts"
- Teaching is always
  - By People
  - To People
  - About People
To People (1)

- Why do we teach gymnastic?
  - Not to learn a perfect somersault …
  - To learn enjoying proper movement …
  - To keep the body healthy – age based

- Why do we teach music and literature?
  - Not to learn song X or poem Y …
  - To learn enjoying proper singing and reading
  - To keep the soul healthy – age based

To People (2)

- Why do we teach mathematics and natural sciences?
  - Not to learn the sine theorem …
  - To learn enjoying proper thinking, abstracting, experimenting …
  - To keep the spirit healthy – age based

- Why do we teach informatics?
  - Not to learn MS Office 2003, Version 1.2.3…
Why do we teach informatics?

- To learn to solve “real” problems with the help of abstract models
- This is a unique feature of informatics
  - In mathematics and natural sciences we also create abstract models but it is much harder to map them to working solutions
- Consequences for the proper age
  - Should not be forced before puberty!

By People

- “We have not the faintest idea how knowledge, insights and habits are transferred.” (E. W. Dijkstra)
  - The essential part of teaching happens in the – often implicit – communication between teacher and pupil
- Computer aided methods has sever limits
  - “Computer generated fairy tales miss the essence: to tell a tale” (J. Weizenbaum)
Science and knowledge do not grow in the field like a plant
We “know” a lot about Mozart and Goethe – even if we do not know their biography
What do we know about Turing or Dijkstra? Why do we know so few?
Science is finally always about people

The importance of the second glance
“He thought he saw an Albatross that fluttered round the lamp: He looked again, and found it was a Penny-Postage Stamp.”
(Lewis Carrol, Sylvie and Bruno)
The first act of “remembrance” is becoming aware of ourselves
Every further remembrance belongs to the self
A science or a person without history has no self-consciousness and therefore no responsibility
The history of computing science still must arise
The historic view on persons (1)

- “We teach students very little about the production of new knowledge” (Nygaard)
  - The “discovery” of the concept of inheritance by the great friends Nygaard and Dahl
  - What they missed: information hiding. Why?
  - “Historically, a "right" answer requires just as much explanation as a "wrong" answer, and both answers are equally interesting -- and equally important” (Michael S. Mahoney)

The historic view on persons (2)

- What can we learn by studying the life and work of scientists?
  - How knowledge is “produced”
  - How ideas are accepted or rejected by others
  - How to handle mistakes and false tracks
  - How to criticize and accept critic
- This makes the subject alive
  - Huge didactic advantage
The historic view on concepts

- We learn to distinguish the essential from the rest
- The history of a concept is always also a history of people
- Great didactical help
  - The historic order is often the best
  - A *deliberate* deviation is also valuable

The history of the *procedure* (1)

- Mathematical function
- The notion of the algorithm – as an effective *procedure*
- The procedure in Fortran and Algol as a combination of these two
  - Procedure declaration and activation
  - Parameters, local variables, return values
  - Recursion
The history of the procedure (2)

- Binding
  - Static – procedure constant
    - Fortran, Algol
  - Dynamic – procedure type and variable
    - Pascal, Oberon
  - Semi-dynamic – virtual procedure or method
    - Simula, Oberon-2

- Binding is not the essential issue
- In the school it is better to start with the essentials

Virtual exhibition, in memory of Dahl, Dijkstra, and Nygaard
Dijkstra on his first mathematical excitement

Conclusions

- We have to know why, to whom we teach
- University curricula should teach inf. history
  - As a basis of self-consciousness and responsibility
- Knowledge is never independent from the people who create and consume it
  - Technique may become murderous if we ignore this
  - “A machine only becomes useful when it has grown independent of the knowledge that led to its discovery. Hence today any fool can make a light bulb glow – or an atomic bomb explode.” (Dürrenmätt)