



Historic and Human View

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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)*

About People

- 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

History as a tool for reflection

- 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

The screenshot shows a Mozilla browser window titled "Video Search - Mozilla". The address bar contains the URL "http://exhibit-tec.uni-klu.ac.at/videosearch/search.jsp". The page content includes a search interface with the following fields and options:

- Annotation search:** "dijkstra 'sheet of paper'" with "Search" and "Clear" buttons.
- Word-connectivity:** Radio buttons for "AND" (selected) and "OR".
- Result granularity:** Radio buttons for "Video" and "Segment" (selected).
- Semantic place:** A text input field.
- Semantic time:** "from" and "to" fields with a "YYYY-MM-DD" format.

The search results section is titled "1 Videosegment(e)" and contains the following information:

- Dijkstra's 1st Mathematical Excitement**
- The 8 year old Dijkstra cannot determine the ratio by which one side of a sheet of paper is decreased when folded symmetrically (square root of 2).
- Semantic time: 1938
- Start: 00:00:00 - Duration: 2min-56sec
- In: Dijkstra's Talk at the 25th Joint International Seminar on the Teaching of Computing Science
- Duration: 1h-3sec
- Table of Contents - Search in video

Dijkstra on his first mathematical excitement



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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.” (Dürrenmatt)

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