Reflections on the role of Programming in Primary and Secondary Computing Education

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Introduction

- Mandatory programming courses for six year old kids (Estonia?)
- Role of Computing in primary education

General Educational Goals

(Cognitive) Definition of Programming

Role of Programming
Goals of Education UN

full development of the human personality and the sense of its dignity,

participate effectively in a free society,
Goals of Education: GFD

1. Developing Identity
2. Coping with everyday life
3. Coping with professional life
4. Participation
Goals of Education

- Development of identity
- Cope with affordances
- Participation in society/democracy
Programming

• (before 1970es): fundamentally easy task, requires learning a programming language
Programming

- (before 1970es): fundamentally easy task, requires learning a programming language
- Programming: designing / modeling and implementing
- Germany: Modeling **vs** Programming
- ITICSE WG: Programming is “the process of planning **or** writing a program.”
What is programming?

- Programming is a special type of interaction with the computer, connected to the loss of direct manipulation and the need to use an abstract notation. Immediate feedback is (often) missing.

What is programming?

- Programming is a special type of interaction with the computer, connected to the loss of direct manipulation and the need to use an abstract notation. Immediate feedback is (often) missing.
- A basic requirement of programming is automation (for later or repeated use of the artifact).
- Programming includes coping with complexity in a specific form; by using self-made representations within the program.
- A program addresses not only the computer as ‘reader’, but also (and probably even more) a human reader, programming therefore includes aspects of a communication process.
- As there is often no clear direct path between the problem and the solution, programming includes a creative process of seeking and finding solutions.
- Programs can be written for personal use, or for others to be used. The affordances for the latter are much higher.
Programming And Education

- Interaction with Computer
- Automation
- Representation
- Human reader
- Seeking solutions
- Personal use, or for others'

- Development of identity
- Cope with affordances
- Participation in society/democracy
(Tool) Building / Participation

Associating the notion of development with constructing, implementing or building

- Participation: maintaining and developing society
- developing~building
  - Digital media
  - Tools
- Programs for others' to use
  - Open source
- Projects
(Tool) Building / Participation

Internal External

- Internal: private, Tools for personal use

- Programming: automation for later use; not necessarily programming=programming language
  - Adapting, configuring, “VCR programming”

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<th>Participation</th>
<th>Goals / What aspect</th>
<th>Approaches / How aspect</th>
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<tr>
<td>internal</td>
<td>Configuring, adapting, developing digital artifacts for personal use and coping with personal life affordances</td>
<td>Projects</td>
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<tr>
<td>external</td>
<td>Configuring, adapting, developing digital artifacts for use by others and for participating in society</td>
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Freie Universität Berlin
Expression / Self-Development

The ability to be creative, to communicate, and to self-express
Expression / Self-Development

The ability to be creative, to communicate, and to self-express

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Thinking / Coping with Affordances

Problem solving and thinking

Squeak

*Powerful Ideas in the Classroom.*

http://www.mttcs.org/Projekte/Squeak/material/ideas_eng.pdf
Thinking / Coping with Affordances

Problem solving and thinking

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## Summary

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<td>Changing code examples</td>
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