Computing education in Poland

Maciej M. Sysło

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- academic teacher and in CS school education since 1985
- leading author of: curricula, syllabi, textbooks, standards, …
- a member of the Council for informatisation of Education, Ministry of National Education since 2002
- represent Poland in TC 3 on education
- a member of the TC 3 WG 3.1: task force on curriculum

History of computers in education in Poland:

- 1965: first regular classes in high schools in Wrocław on numerical methods and programming in Algol – there was no ICT
- 1970: beginning of teachers' training (on main frames)
- 1985: school computer
- 1985: first CS curriculum/syllabus for high schools, approved by the Ministry of National Education
- 1993-2008: several updated versions of CS curriculum
- 1993-2017: several changes in the school system

When a new government came to power in 2015 and planed to completely change our school system, we were ready with a new CS curriculum for all students in K-12. Fortunately, there were „computer classes" at each level and there were also teachers teaching in these classes.

The new curriculum

Introduction on the importance of computer science for our society in general and for our school students in particular

Grades
K, 1-3
1 hour a week

Primary education 2017

Grades
4-8
1 hour a week

Grades
9-11 in HS 2019
1 hour a week
2 extra hours a week for elective extended CS

Purpose of study, formulated adequately to the school level.

Unified aims – the same for all levels, define five knowledge areas in the form of general requirements

Detailed Attainment targets. The targets, grouped according to their aims, define the content of each aim adequately to the school level. Thus learning objectives are defined that identify the specific computer science concepts and skills students should learn and achieve in a spiral fashion through the three levels of their education.

The new curriculum: Unified Aims for each Level

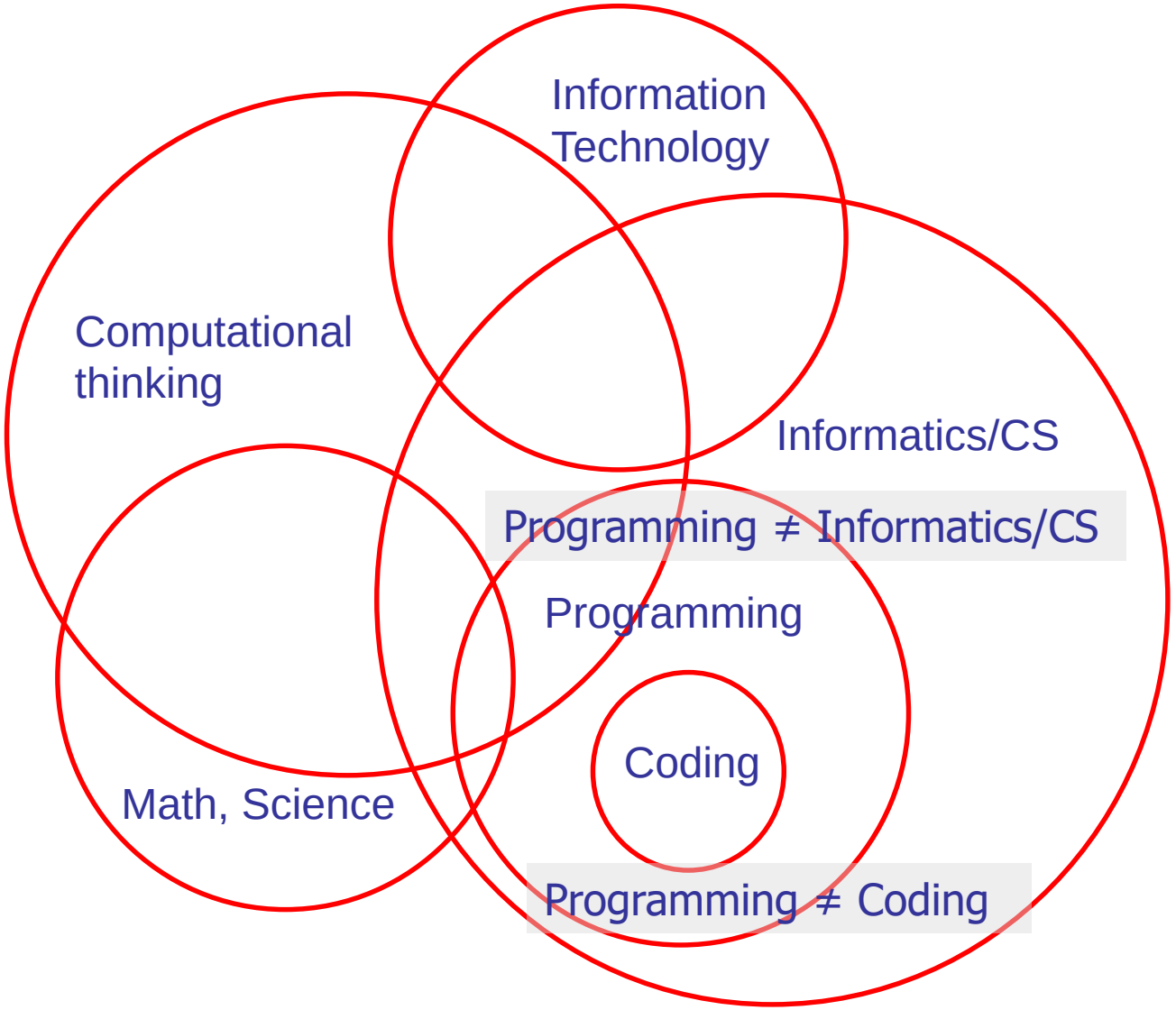
1. Understanding and analysis of problems based on logical and abstract thinking, algorithmic thinking, and information representations.
2. Programming and problem solving by using computers and other digital devices – designing algorithms and programs, organizing, searching and sharing information; using computer applications; ← ICT
3. Using computers, digital devices, and computer networks – principles of functioning of computers, digital devices, and computer networks; performing calculations and executing programs;
4. Developing social competences – communication and cooperation, in particular in virtual environments; project based learning; taking various roles in group projects; equity.
5. Observing law and security principles and regulations – respecting privacy of personal information, intellectual property, data security, netiquette, and social norms; positive and negative impact of technology on culture, social live and security.

Challenges

1. How to motivate and engage students through K -12, for 12 years, e.g. learning programming requires constant practice

   Guimaraes (2016): Introducing … order through 12 years – sorting (as a collection of methods) is present in all curricula

2. The role of coding (programming) – when and how to start with programming
3. When and how to switch from visual to textual programming?
   1. Visual – for beginners, non-professional
   2. Textual – for those who seriously think about CS – we don't want to loose them, for professionals
4. Computer science classes/activities should be about computer science: concepts, methods, algorithms, computational thinking …


Information Technology
Computational thinking
Informatics/CS
Programming ≠ Informatics/CS
Programming
Coding
Math, Science
Programming ≠ Coding

Programming as a language and a tool

The limits of (programming) language of technology
are the limits of learning with technology

[Maciej M. Sysło]

Think computationally then program

The purpose of computing is insight not number

R.W. Hamming, 1959

The purpose of programming is abstraction not programs

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Coding, Programming and the Changing Curriculum for Computing in Schools

Report of UNESCO/IFIP TC3 Meeting at OCCE, June 2018, Linz, Austria

Includes: *A perspective from Poland* regarding 8 challenges