Update report and the way forward

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What's in a name?

• **Informatics** is the largest common root of the various names in Europe of the discipline known in many parts of the world as "Computer Science" or "Computing"
A long journey... – first report in 2013

Informatics Education: Europe cannot afford to miss the boat

- Informatics is a major enabler of technology innovation, ... and the key to the future of Europe’s economy
- Informatics education, unlike digital literacy education, is sorely lacking in most European countries
- Not offering appropriate informatics education means that Europe is harming its new generation of citizens, educationally and economically
- Unless Europe takes resolute steps to change that situation, it will turn into a mere consumer of information technology and miss its goal of being a major player
2017 report

Investigation of the situation in 55 education autonomous administrative units (in 39 countries in Europe). Main outcomes:

- **Informatics** is not on par with other scientific disciplines in school
- Students can graduate from secondary school without ever being exposed to **Informatics**
All students must have access to ongoing education in Informatics in the school system and Informatics teaching should start in primary school.

Informatics should be seen as fundamental to twenty-first century education by all stakeholders (including educators, pupils and their parents).

Informatics courses must be compulsory and recognized by each country’s educational system as being at least on a par with courses in STEM.
Informatics for All

A Grand Educational Challenge for Europe

• Any "digital science" (e.g. Artificial Intelligence, Data Science, Cybersecurity, ...) has Informatics as its "foundation stone"

A two-tier approach

1. Teach informatics as a specialized subject starting in primary all the way up to secondary

2. Teach informatics as a method and language capable to offer an additional and specific way to describe and explain phenomena (integrated in other subjects)

• Not at all easy to implement! A thought experiment: imagine Mathematics teaching exists only at the university and plan how to introduce it into all school levels
Even for Maths now it's important...

- 2019: Revised PISA Maths framework (for 2021 test)
  
  computational thinking = the way computer scientists think

- «... mathematical literacy in the 21st century includes mathematical reasoning and some aspects of computational thinking.»

- «... students should possess and be able to demonstrate computational thinking skills as they apply to mathematics as part of their problem-solving practice.»

- «Aspects of computational thinking form a rapidly evolving and growing dimension of both mathematics and mathematical literacy. The PISA 2021 mathematical literacy framework illustrates how computational thinking is both part of doing mathematics and impacting on doing mathematics.»
Those who fall in love with practice without science are like a sailor who drives a ship without using rudder or compass, who never can be certain where the ship is hailing (Leonardo da Vinci, *Treatise on painting*)

Digital competence without basic education in Informatics?

L'apprenti sorcier
from Fantasia (W.Disney 1940)
music by Paul Dukas
HOW? – The «specialization» path

• Other sciences explain the
  • Physical world (matter)
  • Living world (life)
  • Social world (cognition & relation)
(a set of layered scientific domains)

• Informatics is a discipline of FUNDAMENTAL value, since it’s the science explaining the digital world
• The 4th big domain of science (computation)
HOW? – The «integration» path

• Informatics is a discipline of TRANSVERSAL value, since it's the only scientific discipline whose abstractions (i.e., models) can be **mechanically and automatically** executed (scenario building and phenomena simulation)

• Through digital models subjects can be learned in novel and more engaging ways

• Computational approaches open doors to new dimensions of understanding and new ways of learning subjects
Brussels workshop February 2019

• More than 50 participants
• Country presentations:
  • Denmark, England, France, Germany, Israel, Poland, Portugal, USA
• Action plan
  • Enlarging the coalition
  • Fostering research and networking
  • Repository of resources
  • Contacts with other international organizations (including EC)
  • Develop national communities/networks of teachers
Rome Declaration: March 2019

• call upon all European national and international institutions
• to exercise their moral suasion power so that the principles of Informatics are included as part of school curricula at all levels
• to fund research on Informatics education methods, materials, and teacher training, to teach Informatics both as a distinct subject and across all subjects
• https://www.informaticsforall.org/rome-declaration/
• About 100 signatures
• Translation into French, German, Hebrew, Italian, Polish, Romanian, Russian and Spanish, other languages in preparation
Informatics for All: areas of intervention

- **Policy & Awareness**
  - Informatics education is fundamental for all (Rome Declaration)
  - Enable common people to understand what Informatics really is

- **Curriculum**
  - Develop fine-grained schools national curricula for all levels (possibly a European curricular framework)
  - Develop effective learning materials

- **Teachers**
  - Appropriately educate teachers at all levels
  - Provide all teacher appropriate support (tools and content)
  - Sharing best practices and (national) community building

- **Research**
  - Understand what to teach
  - Understand when to teach
  - Understand how to teach

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http://informaticsforall.org
National workshops (1)

- Austria, TU Wien, Oct 3rd 2019
- [https://www.ocg.at/de/informatiktag2019](https://www.ocg.at/de/informatiktag2019)
- Presentation of Informatics for All coalition and the goal of having informatics education or all pupils of all grades in all school types within Europe
- 120 teachers mostly from secondary schools participated
  - lectures in the morning
  - workshops after lunch
- Representatives from ministry of education were present.
National workshops (2)

- Italy, Univ. Milan, Feb 8th 2020
- 250 participants
  - Lectures by peers
  + hands on labs

https://aladdin.unimi.it/convegni_scuola/2020primociclo.html
THANKS !!!

http://informaticsforall.org