

# Report on the Workshop on Computing in Secondary Education

Lorentz Center, Leiden, The Netherlands

15 - 19 september 2014

According to many experts, notably the Royal Netherlands Academy of Arts and Sciences, secondary education on informatics and digital literacy urgently needs thorough improvement.

The goal of the workshop on Computing in Secondary Education was to develop a contemporary design for the discipline, following and learning from similar efforts in other countries.

During the workshop we have explored curriculum content and pedagogical approaches, addressing both digital literacy (e.g., computational thinking) and more advanced topics (e.g., programming, cognitive computing, data science). Invited speakers from the US, Great-Britain, France, Israel, Germany, and several other countries gave in-depth talks on leading methodologies (like computational thinking) that underly the development of informatics curricula for schools and on key experiences in the practice of informatics curricula in their respective home countries.

The workshop consisted of plenary sessions and working groups during the week, with the ultimate aim to arrive at concrete recommendations that could guide the further development of the subjects in Dutch secondary education, as well as plans for scientific research supporting this development. A special session of the workshop was devoted to a meeting with 16 pupils from Dutch VWO-schools who showed the kind of informatics projects they did at their schools and who shared their views on the subject, often far ahead of the current curricular requirements and stressing the need for 'vernieuwing'.

The working groups during the week were designed to explore and elabo-

rate on the following important themes:

- develop student personas based on student characteristics, appropriate computing contexts to be used in education for these personas, together with a description of the computing concepts addressed for these personas in these contexts.
- link computing themes to other school subjects, use these links to describe computing contexts from non-ICT school subjects, identify computational thinking aspects appearing in these contexts, and discuss pedagogical challenges.
- identify what students must learn to successfully apply programming, where programming is seen as a crucial ingredient of broader skills such as problem solving or designing (creating worlds), and why this important, distinguishing learning goals and key concepts.
- test the applicability of the Next Generation Science Standards (US) and design a suitable framework of (1) practices, (2) crosscutting concepts, and (3) disciplinary core ideas for a specific area in Computing.

The workshop concluded with a public event at the Museum Boerhaave, at which representatives from the government, parliament, employers, higher education, and teacher associations commented on and discussed the results from the workshop. There was a general consensus that schools should embrace computing as a subject at all levels and that the community should move swiftly and aptly in redefining its contents.

The workshop was a very lively and stimulating event, full of discussions and interactions between all participants. We are grateful to the Lorentz Center for providing a superb working environment for the meeting.

For a complete overview of the presentations, background literature, discussions, and working group sessions, please consult the wiki for the workshop: [http://infvo.com/lorentz2014/index.php?title=Main\\_Page](http://infvo.com/lorentz2014/index.php?title=Main_Page).

Erik Barendsen (RU Nijmegen / Open University NL)

Eelco Dijkstra (Bètapartners Amsterdam)

Johan Jeuring (Utrecht University / Open University NL)

Jan van Leeuwen (Utrecht University)

Jan Karel Lenstra (CWI Amsterdam)