



CEPIS
Council of European Professional
Informatics Societies

Computing in Schools

A Call for Action from Informatics Societies



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1. Computing in Schools: What is at Stake

As ICT increasingly pervades society and the economy, the demand for IT personnel is growing fast, outpacing the current supply of qualified professionals and producing chronic shortages in the computing industry. The low numbers of students choosing computing as a career is exacerbating the situation.

Immediate action is needed to better integrate Computer Science in the school system and change the perception of computing among young people.

- **Students:** Children and young people now use computers, smart phones and tablets every day to communicate with their peers, play music, access information and media. However, they are rarely encouraged to understand the basic principles upon which this global phenomenon of personal devices is based. Where computing is indicated as a separate subject on the curriculum, it often focuses on the necessary user-level skills often through programmes such as ECDL.

Students need digital literacy and digital competence to equip them with the skills they need for a technology-enabled workforce, where an estimated 90% of jobs require such skills¹. However to encourage more students towards computing as an option that is seen as a dynamic and challenging career, even in the current crisis, an introduction into computational thinking should also be provided. The adoption of a more holistic approach should be encouraged in which digital literacy skills, and those that make up Computer Science, such as programming, are delivered in a complementary fashion.

- **Teachers:** The proliferation of games and social media has motivated the young to become familiar with the use of technology. As a result students are perceived as more proficient in the use of devices and teachers are embarrassed by their lack of expertise in the field. Many do not even use the technology available as a teaching tool. Very few have any formal education in computing since teacher training does not normally require any fundamental knowledge of computational thinking.

Consequently most teachers are ill-equipped to encourage students to understand the fundamentals of hardware and software. They have little perception of the nature of work that is carried out in companies which are significant users of computing, and most have almost no understanding of the work in companies which design or build computer hardware or software.

- **Parents:** All parents are keen to see their children in gainful employment, and ideally in a discipline which is highly regarded on the social scale such as Law, Accountancy or Medicine. Parents and teachers combine in pointing the student towards a career.

Yet very few have any knowledge of either what a career in computing requires or of the nature of the work that their son or daughter would be doing in computing.

¹ Post Crisis: e-Skills Are Needed to Drive Europe's Innovation Society' – IDC (2010)



Computing is also perceived as a geeky subject unsuitable for girls. As a result, parents get little guidance from their school about the career opportunities in computing.

The Result: The combined effect of these problems means that students are missing out on an exciting, demanding and profitable career as ICT becomes ubiquitous and Europe faces a major shortage of IT Professionals.

2. What Needs to be Done

The school ICT curricula need to reflect a balance between the development of Digital Literacy and Computer Science. Students should all acquire a set of digital literacy skills, to enable them to participate in today's increasingly digital society, but also understand the fundamentals of the technology so that they have the choice to develop more advanced skills related to Computer Science².

Educators need to prepare students with the appropriate core of knowledge in computing so that they are equipped to develop careers in this field. The curriculum needs to change (or be developed) to reflect the subject matter appropriate to the hardware and software in use today.

Computer Science should be offered a similar status in the curriculum as Mathematics, Physics and Chemistry. Computing is a neglected subject in school because it is not perceived as important, this means that children often don't choose it and consequently many schools decide not to offer classes.

Teachers need to understand the wide variety of careers available and inspire students to study what is an exciting and challenging subject. This can only be achieved by training teachers in the basic body of knowledge necessary and by encouraging them to use the technology in teaching.

Ideally, computing teachers should be Computer Science graduates themselves. This will ensure that computing teachers have the right skills and a strong knowledge of the subject in order to help their pupils. Computer Science graduates should be encouraged to consider teaching as a viable career path, for instance, by having the possibility to teach a class as part of their degree.

The perception of the subject among parents needs to be altered so that they are motivated to exert a positive influence on the choice of career by their children and the opportunities it offers.

3. What CEPIS Can Do

The Council of European Professional Informatics Societies (CEPIS) is a non-profit organisation seeking to improve and promote a high standard among informatics professionals in recognition of the impact that Informatics has on employment, business and society. CEPIS

² 'Developing Appropriate Skills for the Future: Teaching the Right Technology Skills' - ECDL Foundation (2013)



represents 35 Member Societies in 32 countries across greater Europe CEPIS is recognised as a contributor to the Grand Coalition for Digital Jobs³ whose aim is to increase the overall supply of digitally skilled professionals and to better match the supply and demand of digital skills.

One of the most important achievements of CEPIS was the creation of ECDL (the European Computer Driving Licence)⁴ to raise the levels of digital literacy throughout Europe. Since then ECDL has become the leading digital skills certification in the world with more than 13 million candidates enrolled in the programme. Digital skills at the user level remain a core concern of CEPIS, and all schools are encouraged to ensure they equip their students with the digital skills needed for the workplace today.

CEPIS has this year established a Special Interest Network (SIN) on Computing in Schools. This group brings together experts from around Europe with a view to encouraging the teaching of computing in schools and to share good practice. Some examples of good practice include:

- The Computing at Schools (CAS) Working Group⁵ in the UK which has over 400 teachers and computer professionals working together to establish Computer Science as an important subject in the school curriculum. The Working Group is also supporting ICT and computing teachers by providing them with teaching material, training, local hubs, and the opportunity to get in touch with others colleagues like-minded about computing.
- The Bebras contest⁶ which is an international informatics competition aims to promote Computer Science to school students. The contest focuses on developing the problem-solving skills of students who are asked to complete various tasks involving algorithms and programming methods. The Bebras contest took place in 29 countries in 2013.
- The introduction of informatics as a compulsory subject at the primary and secondary school level in Slovakia. The curriculum blends closely digital literacy and Computer Science. It addresses questions related to the digital world as well as other topics such as programming and algorithms. The emphasis is on digital literacy in primary school, afterwards the focus shifts to informatics in upper secondary school.
- The Day of Informatics Teaching which is celebrated annually in Switzerland⁷. It aims to foster the exchange of experience in teaching of informatics, present new

³ The Grand Coalition for Digital Jobs is a multi-stakeholder partnership launched by the European Commission in March 2013 to increase the overall supply of digitally skilled professionals and to better match supply and demand of digital skills. More information: <http://ec.europa.eu/digital-agenda/en/grand-coalition-digital-jobs-0>

⁴ <http://www.ecdl.org>

⁵ <http://www.computingatschool.org.uk>

⁶ <http://www.bebras.org>

⁷ <http://abz.inf.ethz.ch/stiu-fuenf>



approaches in this area, and award special achievements. It is organised by the Swiss Federal Institute of Technology.

- The Scratch competition⁸ in Ireland which encourages young people to develop small pieces of software using a simplified programming language. The Scratch competition aims to raise students' interest in software development by providing a better understanding of how software is built and works. Scratch is currently taught in over 700 classrooms across Ireland at primary and secondary level.
- The Code Kinderen⁹ initiative in The Netherlands provides educational materials for teachers in order to teach coding and programming to children. Code Kinderen intends to make children more aware of how technology works and discover their technological talent through play.
- The Coder Dojo¹⁰ initiative which runs free not-for-profit coding clubs and regular sessions for young people between 5 and 17. At Dojos, young people learn how to code, develop websites, apps, programs, games, etc. Dojos are set up, run by volunteers. The first Coder Dojo was launched in Ireland in 2011; there are now 345 Dojos in 38 countries.
- The RoboCup contest¹¹ which is an international robotics competition for children. The goal of RoboCup is to challenge children to build a robot that can play football. By using football as a subject, many young people will get interested in the RoboCup.

4. Practical Assistance

As the organisation representing 35 national informatics societies in 32 countries across greater Europe, CEPIS is willing to help to:

- highlight the importance of Computer Science, demonstrate how exciting the subject is, and show how computational thinking can be applied elsewhere
- provide examples of jobs in IT as well as IT ambassadors to local schools, help career teachers understand the breadth of jobs available, encourage parents to consider careers in IT for their children
- organise visits to companies where appropriate for both teachers and students, encourage companies to partner with schools and provide temporary work placements for teachers

⁸ <http://www.scratch.ie>

⁹ <http://www.codekinderen.nl>

¹⁰ <http://www.coderdojo.com>

¹¹ <http://www.robocup2013.org>



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- form local hubs where teachers can share experience about teaching computing, assist in looking at how the subject is taught, and bring the curriculum up to date if it exists or provide input to a new design

As members of the international community of IT professionals we can:

- highlight success stories in other European countries
- help import best practice from elsewhere
- build transnational contacts for teachers
- encourage twinning of schools in different countries