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# Pedagogy by proxy: developing computing PCK through shared lesson resources

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### Computing programmes of study: key stages 1 and 2 National curriculum in England

A high-quality computing education equips pupils to use computational thinking and change the world Computing has deen links with prediction to understand and change the world. A high-quality computing education equips pupils to use computational thinking creativity to understand and change the world. Computing has deep links with mathematical exception and decision and technology, and applications and technology. creativity to understand and change the world. Computing has deep links with mathematics, Science, and design and technology, and provides insights into both mathematics, Science. The arms of computing is computer existence in which results and existence in which results are a computer existence. mathematics, science, and design and technology, and provides insignts into both and artificial systems. The core of computing is computer science, in Which pupiling and artificial systems. The core of computing is computed by the provided provided the provided provided provided the provided provide and artificial systems. The core of computing is computer science, in which pupitable the principles of information and computation, how digital systems work and the principles of information and computation, and the transfer of the principles of taught the principles of information and computation, how digital systems work put this knowledge to use through programming. Building on this knowledge to use through programming to the information for the put this knowledge to use through programming to the information for the put the principle are equipmed to use information for the put the principle are equipmed to use information to the put the put the principle are equipmed to use information to the put the pu put this knowledge to use through programming. Building on this knowledge understanding, pupils are equipped to use information technology to create equipped to use information technology. understanding, pupils are equipped to use information technology to create systems and a range of content. Computing also ensures that pupils becomes the systems and a range of content. systems and a range of content. Computing also ensures that pupils become the systems and develop their ideas the system of the systems and develop their ideas to the systems and develop their ideas to the systems are supplied to the systems and develop their ideas to the systems are systems. interace – able to use, and express themselves and develop their ideas it and communication technology – at a level suitable for the future works

participants in a digital world.

The national curriculum for computing aims to ensure that all pur abstraction, logic, algorithms and data

proce



### Computing programmes of study: key stages 3 and 4 National curriculum in England

Purpose of study

A high-quality computing education equips pupils to use computational thinking and A nign-quarry computing education equips pupils to use computational training creativity to understand and change the world. Computing has deep links with creativity to understand and change the world. Computing has deep links with mathematics, science, and design and technology, and provides insights into both natural and artificial systems. The core of computing is computer science in which number are mathematics, science, and design and technology, and provides insights into both natural and artificial systems. The core of computing is computer science, in which pupils are supported to the control of information and computer science, in which pupils are supported to the control of the c and artificial systems. The core of computing is computer science, in which pupils are through to use through power and the computation, how digital systems work, and how to taugnt the principles of information and computation, now digital systems work, and put this knowledge to use through programming. Building on this knowledge and continued to the information technology to contain a continued to the information technology to contain a contain and the contains technology. put this knowledge to use through programming. Building on this knowledge and understanding, pupils are equipped to use information technology to create programs, contains also ancience that pupils harvong dividually. understanding, pupils are equipped to use information technology to create programs, systems and a range of content. Computing also ensures that pupils become digitally and to use and surface themselves and develop their ideas through inform systems and a range or content. Computing also ensures that pupils become digitally literate — able to use, and express themselves and develop their ideas through, information technology. The standard of th ilterate – able to use, and express themselves and develop their ideas through, information narticinants in a dicital world.

The national curriculum for computing aims to e can understand and apply the fundamental princip

science, including abstraction, logic, algorithm

Information Technology

Digital Literacy

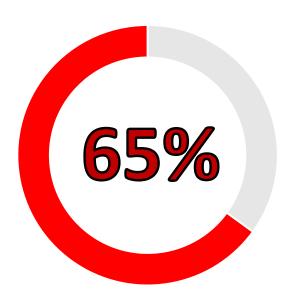
Computer Science





### How do these teachers know how to teach CS?

Do not have a relevant first degree and teacher training qualification to teach ICT



Source: Royal Society 2012, p. 71-72





Video-calling and desktop-sharing (Hidson, 2020)



## Communities of practice: 'anytime, anywhere personal learning networks' (Trust, 2016)

- Internet searching as a starting point
- Online sharing platforms
- CAS face-to-face and online
- Commercial and 'cottage industry' providers
- Programming reference sites







### **Teaching materials**

- 1. Bespoke lesson resources, created by teachers for a specific purpose
- 2. Gathered, unmodified resources located and used with little or no change
- **3. Repurposed** lesson resources, gathered and modified by the teacher to fit their lesson objectives more effectively









Subject Matter Content Knowledge	Pedagogical Content Knowledge (PCK)	Curricular Knowledge
The amount and the organization of knowledge in the mind of the	Subject matter for teaching	[educational] programs designed to teach particular subjects and
teacher	Aspects of content most germane to its <i>teachability</i> Representations: analogies, illustrations, examples, explanations, demonstrations	topics
Content can be represented and theorised in various ways		Instructional materials: texts, software, programs, visual materials, films, demonstrations
The teacher's subject matter	Understanding of what makes the	etc.
content understanding in relation to the discipline	learning of specific topics easy or difficult	Understanding of the characteristics of the materials

### The educative role of resources - PCK by proxy

• The unheard commentary that is part of any shared lesson resource

This meta-information is the key to PCK

- A state of transitional pedagogical reasoning – scaffolded by a more knowledgeable other
- External knowledge validation resources and support



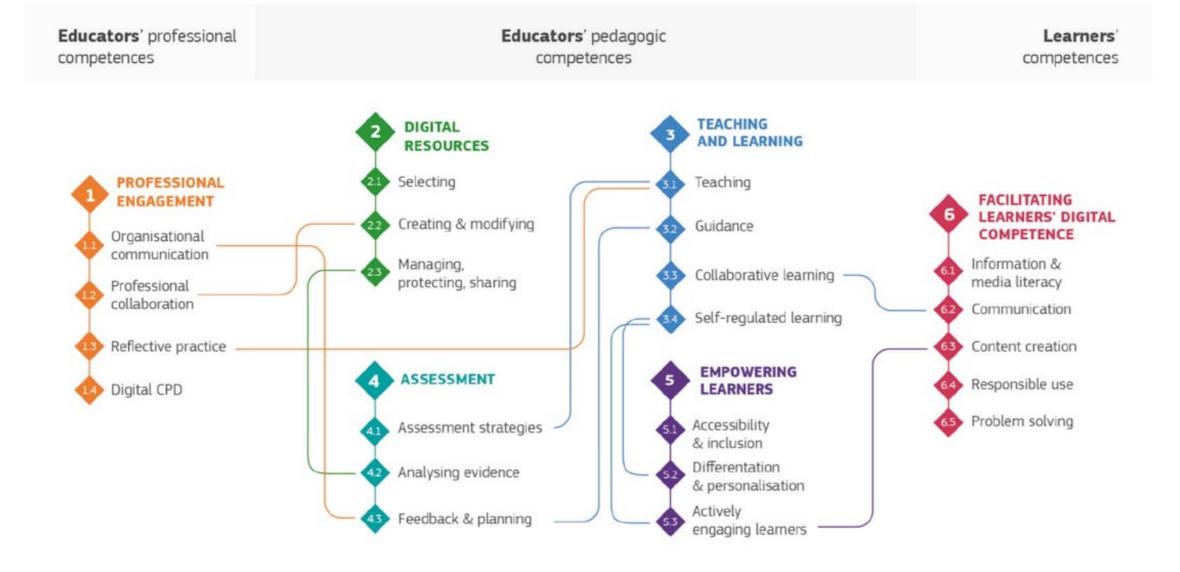


### But weren't these just very tech-savvy teachers?!



### ALL teachers need digital competence





European framework for the digital competence of educators:

DigCompEdu - competences and their connections (Redecker, 2017, p. 16)

### **Digital Resources**



### Selecting digital resources

To identify, assess and select digital resources for teaching and learning. To consider the specific learning objective, context, pedagogical approach, and learner group, when selecting digital resources and planning their use.



#### Creating and modifying digital resources

To modify and build on existing openly-licensed resources and other resources where this is permitted. To create or co-create new digital educational resources. To consider the specific learning objective, context, pedagogical approach, and learner group, when designing digital resources and planning their use.



#### Managing, protecting and sharing digital resources

To organise digital content and make it available to learners, parents and other educators. To effectively protect sensitive digital content. To respect and correctly apply privacy and copyright rules. To understand the use and creation of open licenses and open educational resources, including their proper attribution.

TABLE 2: AREA 2 - DIGITAL RESOURCES

(Redecker, 2017, p. 20)

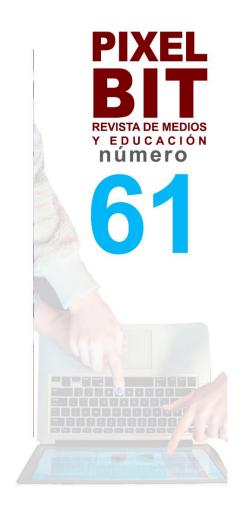
### Implications for teacher education

- <u>Digital competence</u> with a clear focus on <u>pedagogical reasoning</u> as part of all initial teacher education and agile professional development
- Acknowledge and teach pedagogical reasoning and PCK
  - Know what you need to be able to teach
  - Know how to find it, and where
  - Know how to re/purpose it
  - Know how to teach with it (teachability -> PCK)





Pedagogy by proxy: teachers' digital competence with crowd-sourced lesson resources





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