Informatics for All

– A European Initiative

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European Computer Science Summit
Gothenburg, Sweden, 8th October 2018

Agenda

- **Informatics for All: The Strategy**
  - Background
  - Content
  - Recommendations
- **Discussion**
  - Content & Recommendations
  - Political action & Communication action

- **Why this? – We need your help!**
  - How can we help bring this forward in various countries?
  - How can we establish political (inter-)action with national ministries?
  - What can we do together/individually?
  - Recruitment of members to WG on Informatics Education
  - Interface between K-12 and university (entrance requirements)

Joint ACM-E and IE White Paper (2018)

Informatics for All
The strategy

ACM Europe & Informatics Europe

February 2018

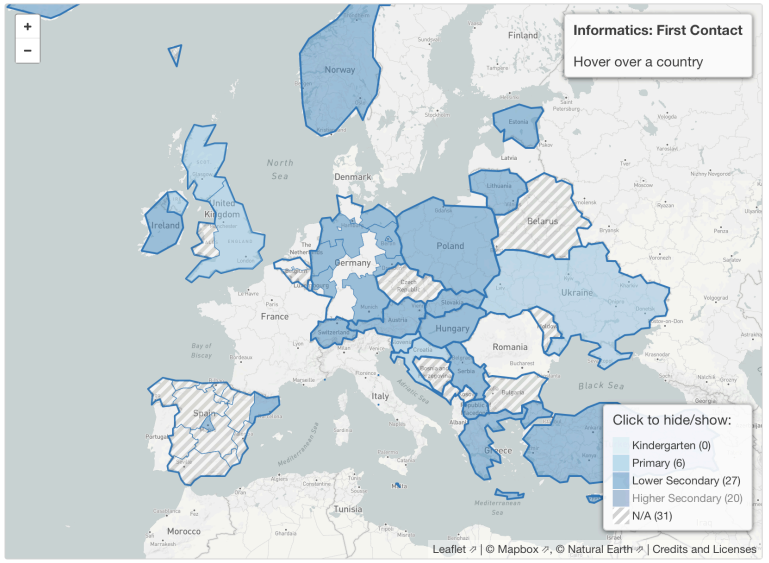
acm Europe Council

INFORMATICS EUROPE

Contents

CECE Report (2017)

Informatics: First Contact



Recommendations

Informatics (3)
Digital literacy (3)
Teacher training (2)

Digital Competences in the 21st Century

Knowledge area
As subject
In subjects

Informatics

Advanced
('for some', 'for career', in-depth)

Fundamental
('for all', 'for life', general 'bildung')

As radical, novel, and defining technology and way of working (innovation of subjects)

Specialisation
(as subject / study programme)

Integration
(in subjects / study programmes)

Support
Technological, practical, pedagogical, and subject-specific

Subject-specific
As subject-specific tool/media

Pedagogical
E-learning and collaborative tools

Practical
Digital literacy ("ECDL") – literate *consumer* of IT

Technological
Technology and infrastructure

2013
2014
2015
2016

The White House
Office of the Press Secretary

For Immediate Release

January 30, 2016

Weekly Address: Giving Every Student an Opportunity to Learn Through Computer Science For All

https://www.whitehouse.gov/the-press-office/2016/01/30/weekly-address-giving-every-student-opportunity-learn-through-computer

Informatics

New aspect of 'bildung'

New basic competence for all

Art German Music ... Technology Design Geography
Economy Social science English Psychology
Geology Marketing Spanish Biology Literature
History Physics Classical history Chemistry
Chinese Biotechnology

Informatics

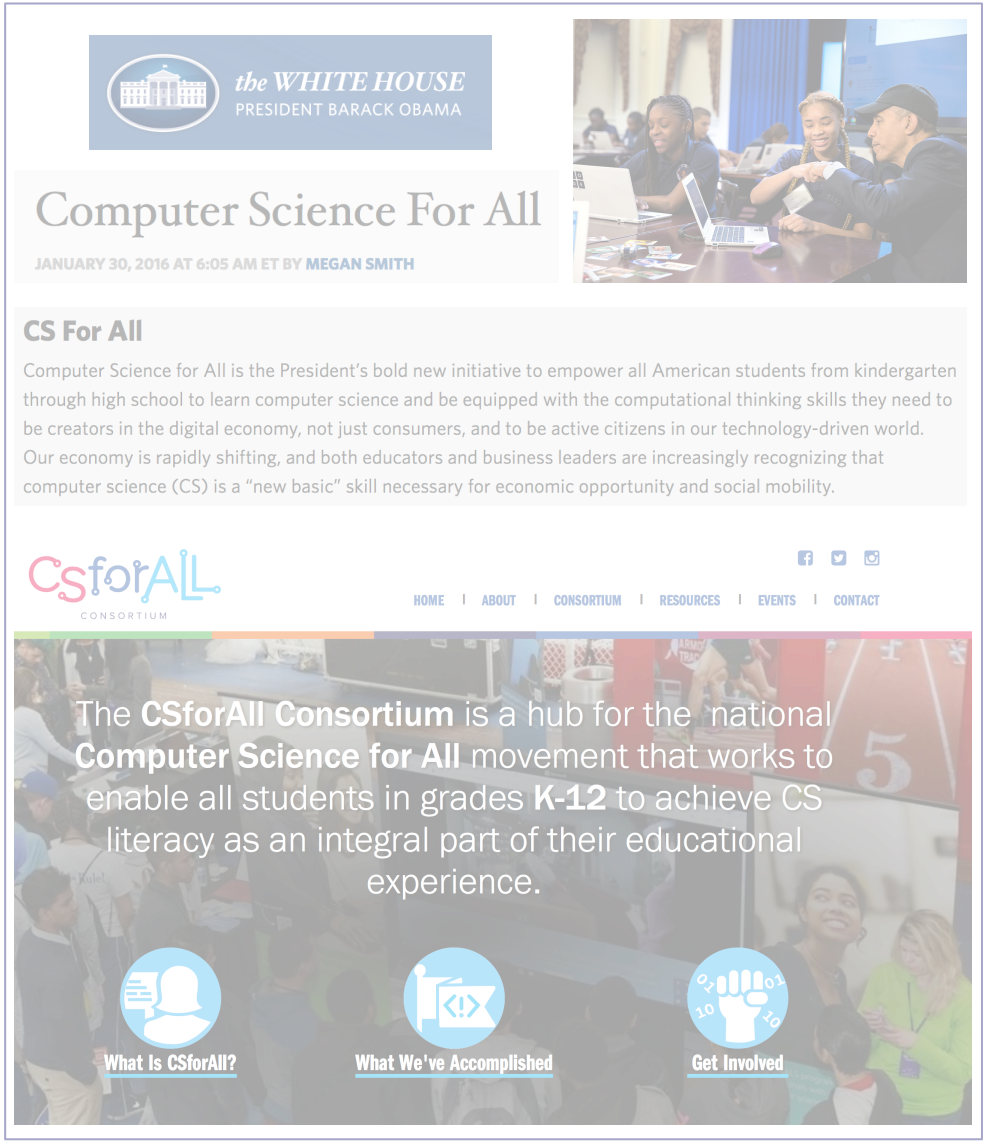
Reading Writing **Informatics** Mathematics

Mathematics is (primarily) the language of science

Informatics is (becoming) a language of all subjects

CS for All

Informatics for All



Informatics for All

A similar joint effort
by a coalition of
the major
informatics organisations
in Europe

acm Europe

INFORMATICS EUROPE

CEPIS

Informatics for All Group

Chair	Wendy Hall
ACM Europe	Judith Gal-Ezer Andrew McGettrick
Informatics Europe	Enrico Nardelli Michael E. Caspersen
CEPIS	Bob McLaughlin Austeja Trinkunaite
Advisor	Bobby Schnabel

Two-tier strategy:

Informatics

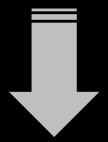
- as subject (specialisation)
- in all subjects (integration)

[at all educational levels]

Specialisation

Current change in public perception of Informatics:

"a useful tool and infrastructure to facilitate numerical, administrative and industrial processes"



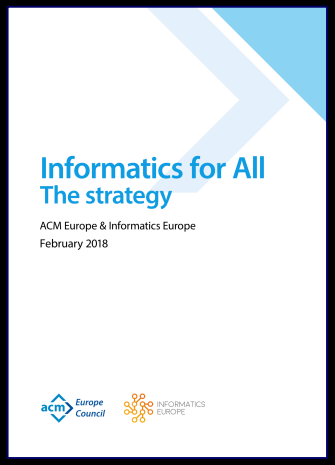
"ubiquitous and a driver of innovation and development in all fields (professions, school subjects and research areas)"

Integration

Like professions and scientific fields, all school subjects are gradually transformed because of Informatics.

Through digital models, subjects can be learned
in novel and more engaging ways,
computational approaches
will open doors to
new dimensions of understanding and expression
and radical new ways of learning subjects.

Recommendations



Curriculum

- R1: All students must have access to ongoing education in Informatics, preferably from primary school...
- R2: Informatics curricula should reflect the scientific and constructive nature of the discipline...
- R3: Informatics courses must be compulsory and at least on a par with courses in STEM disciplines...

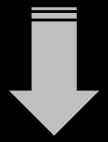
Teachers

- R4: All teachers at all levels should be digitally literate...
- R5: Informatics teachers should have appropriate formal education...
- R6: Higher education institutions should provide encouraging programs...
- R7: Ministries should [...] establish national or regional centers for PD...

Research

- R8: Intensive research of three different facets, curriculum, teaching methods and tools, and teaching the teachers is needed to successfully introduce Informatics into the school system

Informatics on a par with
courses in STEM disciplines



Informatics **at least** on a par with
courses in STEM disciplines

[Informatics on a par with Mathematics]

Two Challenges for our Community

To clarify and set direction
(outward)

To deliver
(inward)

Our Grand Educational Challenge

Expansion of Informatics (think math)

Educational level	Integration (in subjects/programmes)	Specialisation (as subject/programme)
Higher		
Secondary		
Primary		

New type of research group?

Informatics Education Research

Curriculum ♦ Teachers (food chain) ♦ Research

W i d e r r o l e
of Informatics in universities

Research
Study programmes

Working Session on Wednesday afternoon

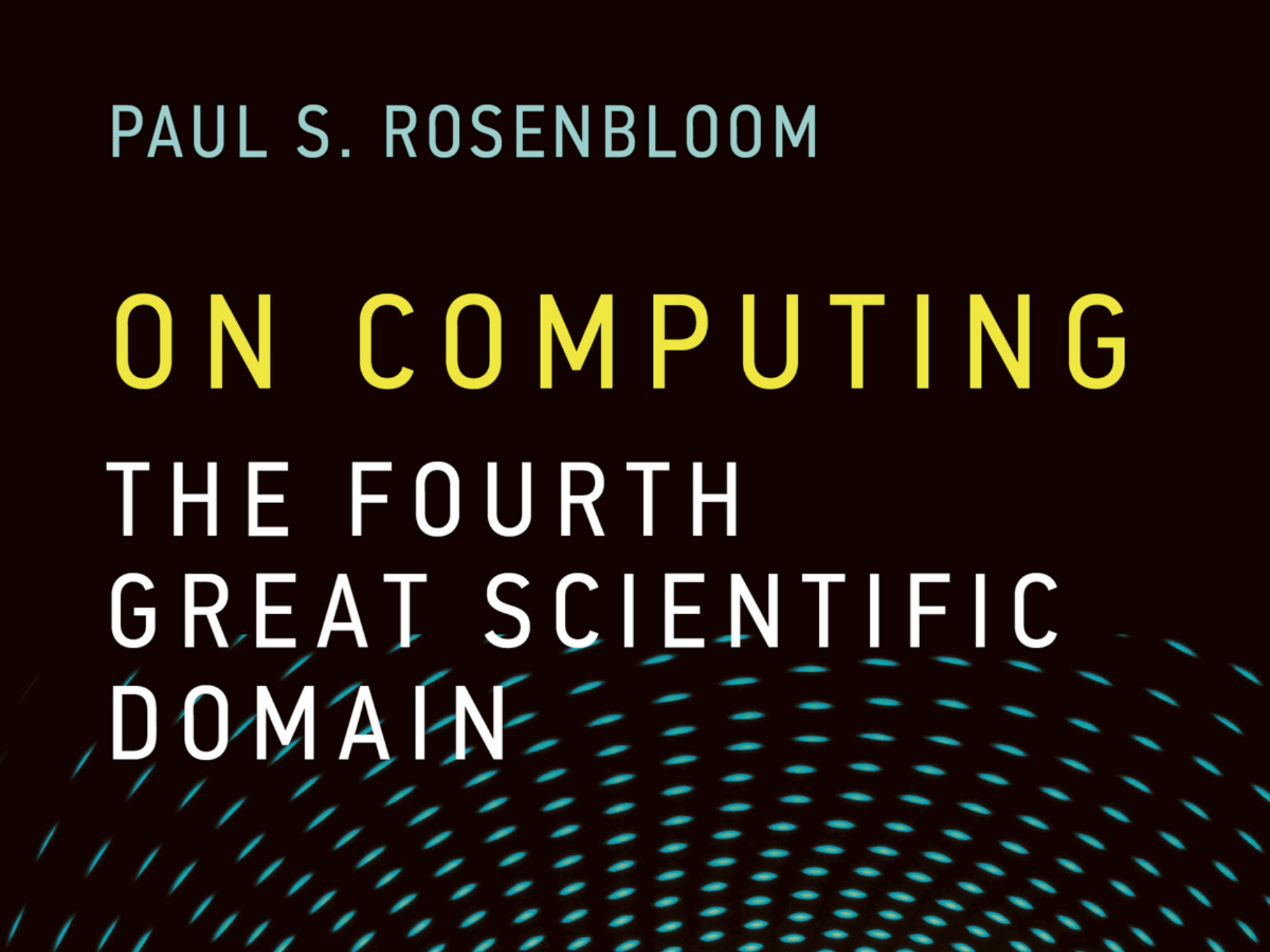
Keynote @ ECSS 2015

Shifting Identity in Computing: From a Useful Tool to a New Method and Theory of **Science**

PAUL S. ROSENBLOOM

ON COMPUTING

THE FOURTH GREAT SCIENTIFIC DOMAIN

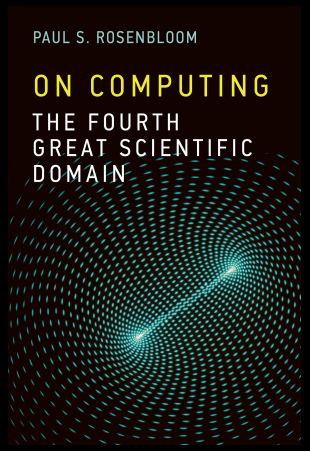


The Fourth Scientific Domain

Technical, natural and health science
Nature can be understood – measured and weighted
Study and manipulation of nature

Humanities
Study of humankinds cultural products and languages

Social sciences
Study of society and organisations



Informatics/Computing

The world (the real and the imaginary) is computable
Study and construction of (prototypes for)
computationelle structures, processes, artefacts and systems

Rich relations to and implications for
the three classical scientific domains

Computational X, for X =

Economics

Education

Psychology

Chemistry

History

(Molecular) Biology

Linguistics

Physics

Archeology

Musicology

Ethnography

Theology

Literature

Law

Journalism

Social Science

...

Computational skills

in all study programmes, e.g.:

1. Problem framing
From wicked to tamed problems

2. Data and data processes
Collect, create, analyse, manipulate, transform and visualise data

3. Modelling and simulation
Design, construct and evaluate computational models

4. Computational problem solving
Algorithmic thinking, programming, computational abstractions

5. Systems thinking
Understand, describe and define complex systems in terms of phenomena and their relations

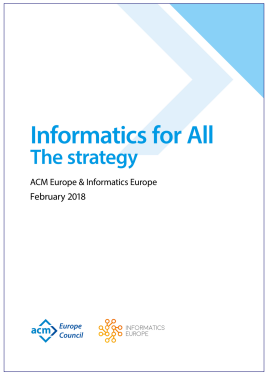
Next steps

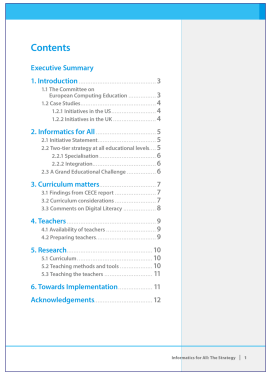
Wider role of Informatics in Universities
Research and study programmes
Working Session on Wednesday afternoon

PISA (OECD)
Mathematics: Computational Thinking (a hook)
Sciences: Physical, Life, Earth and Space, Digital

An event in Brussels (early 2019)
Representatives from EU, industry, academia, teacher organisations, ...

Joint ACM-E and IE White Paper (2018)





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[At all Educational Levels]

Informatics

New aspect of 'bildung'

New basic competence for all

Art, German, Music, ..., Technology, Design, Geography, Economy, Social science, English, Psychology, Geology, Marketing, Spanish, Biology, Literature, History, Physics, Classical history, Chemistry, Chinese, Biotechnology

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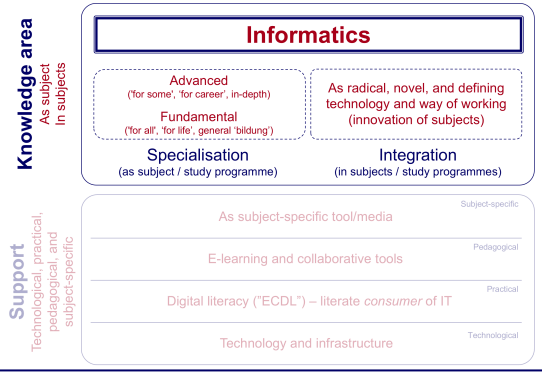
Digital Competences in the 21st Century



Integration

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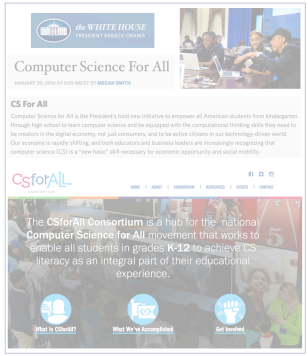
CS for All



Informatics for All

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New type of research group?
Informatics Education Research

Curriculum ♦ Teachers (food chain) ♦ Research

Discussion

- **Content & Recommendations**
  - Curriculum
  - Teacher Education
  - Informatics Education Research
  - Two-tier strategy at all educational levels
- **Political action and communication actions**
  - National level
  - European level
- **We need your help!**
  - How can we help bring this forward in various countries?
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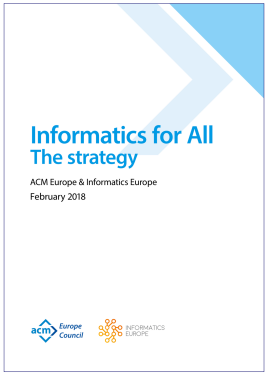

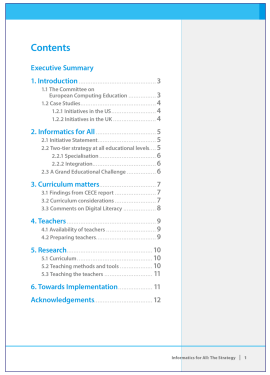

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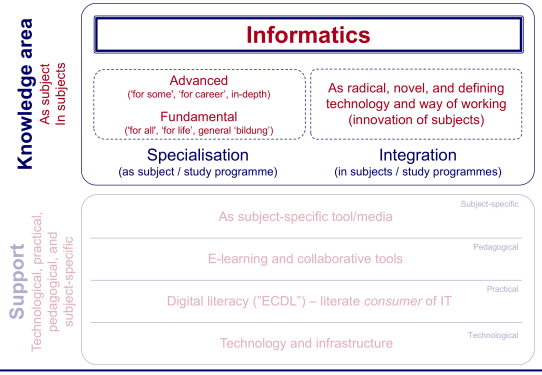

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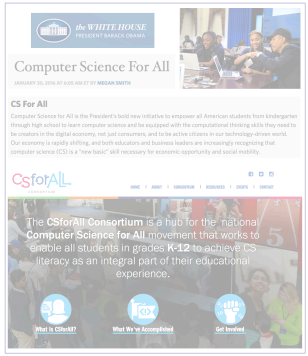

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