Digital transformation of education and science and its consequences

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Overview:

- *Two implications*
- *Analysis*
- *Recommendations*
- *Croatian case*
- *Conclusions*
- *Discussion*

„If we teach today's students as we taught yesterday's, we rob them of tomorrow."
John Dewey

Implication 1

Digital transformation of economy and society

Digital transformation of schools and universities

Implication 2

Digital transformation of schools and universities

Digital transformation of economy and society

Discussion:

- Which implication is more accurate?
- Is it possible that (once again) education and science is in front of industry and how to achive that?

Is there anyhing missing?

Supporting Implication 1

- The kind of things that are easy to teach are now easy to automate, digitize or outsource.
- Digital technologies can also promote social inclusion by creating better access to quality education and offering new opportunities for skills development (OECD, 2014)
- "MOOCs" and mobile learning are filling education gaps
- Technology creates and destroys jobs (?)
  - Jobs that will disappear (lost the race against the machine).
    - clerks and administrative staff, professional drivers (Frey, Osborn, 203)
  - Jobs that are in collaboration with machines / algorithms (run with the machine).
    - doctors / surgeons, teachers
  - Jobs that are completely new or remain largely untouched
    - new roles that involve managing data and machines, security & privacy

How to respond to that in the education systems?

The futur job market

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Supporting Implication 2

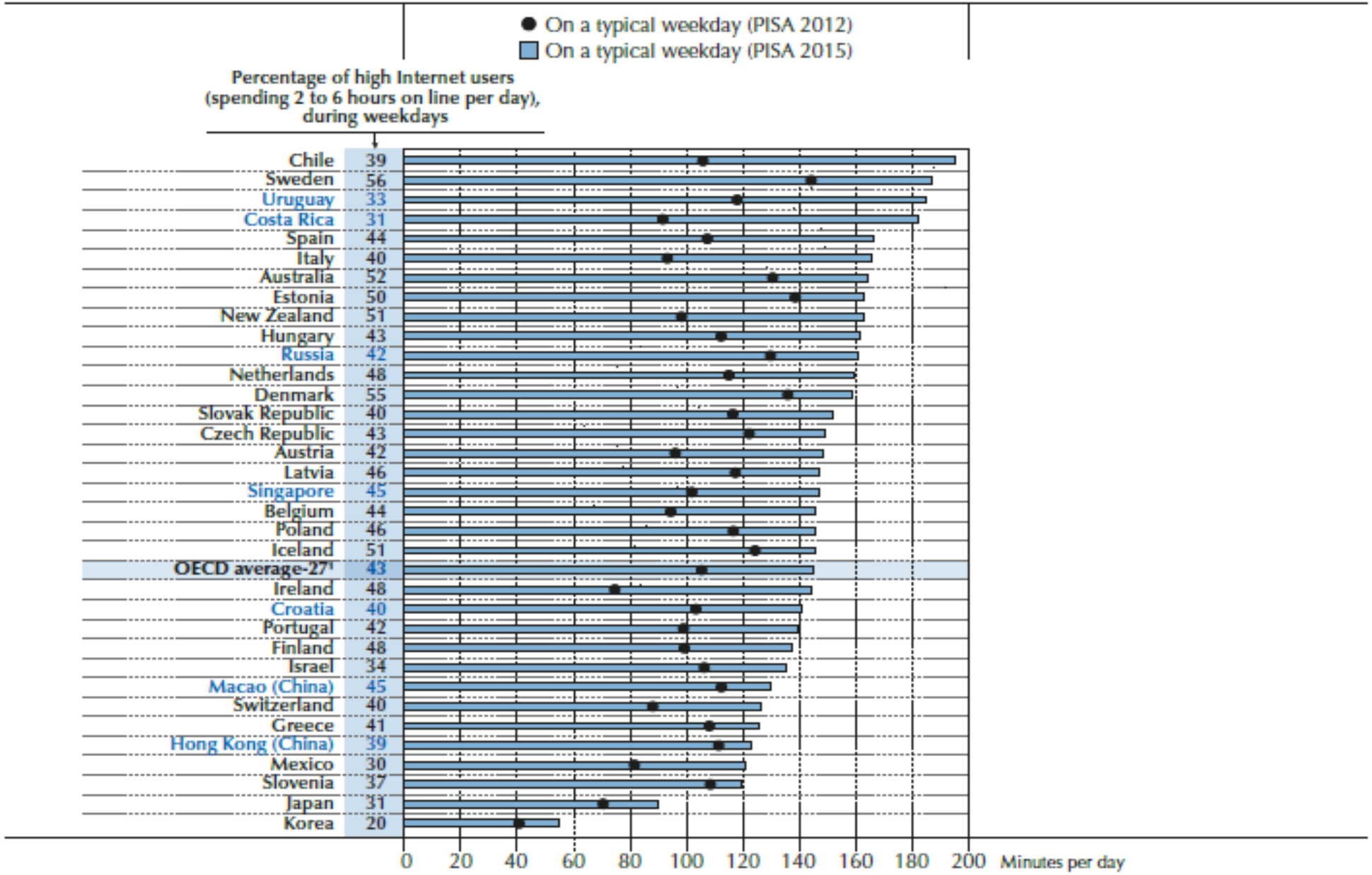
- Seizing the opportunities and mitigation of challenges/risks
- Ethical issues of digitalization, reflecting on develepment or streamlining and policy leading
- New approaches to education, training, re-skilling - to maximizing the benefits of a digital and inclusive economy and society today (**digital age**) and in the future (**conceptual age**? – Pink „A Whole New Mind: Why Right_Brainers Will Rule the Future?)
- Skills:
  - Basic skills and literacies
  - Digital (computational skills)
  - Science, technology, engineering and mathematics (STEM) skills
  - Computational skills
  - Soft skills – creativity, innovation, design, organizational change, entrepreneurial creativity …

State of the art – reform goals and technology risks

- Nearly one in five 15-year-old students in OECD countries does not acquire the minimum skills necessary to participate fully in today's society. Some 16% of recent (education) reforms focus on ensuring **quality and equity** in education.
- Some 29% of reform measures considered in the report aim to better **prepare students for the future**.
- Many countries also introduced policies to ensure that students can find a **job** or a place in **further education**.
- Source: OECD (2015) Education Policy Outlook 2015: Making reforms Happen, OECD Publushing.

Figure III.13.3 ▪ **Change between 2012 and 2015 in time spent on line outside of school**

Minutes per day spent using the Internet



1. "OECD average-27" includes OECD countries with available data for both PISA 2012 and PISA 2015.

Gaps

- **Digital divide**
- Gap between "**Technology** 4.0" and "**Policy** 1.0"
- Gap between "**Jobs** 21th century" and "**Education** 20th century"
- **Age** gap –
  - Younger people are better prepared for the digital working environment than older people
  - 55% of workers lack basic problem-solving skills in technology-rich environments (PIAAK, 2015)
- **Skills mismatch** - Not just more skills but different set of skills
  - Educational system's inability to keep up with technological change (Goldin and Katz, 2008)

Leadership – systemic change

- Changes **throughout** the system
- Creating a **continuous cycle** of innovation and improvement
- Bring **stakeholders** together and to manage these deep, systemic changes
- Even talk to those who think the reform is not needed ☹
- Leaders **bottom-up and top-down**
- Leaders as **problem-solvers**
- „People recognize that even though money is tight and change is hard, we have to move forward.” Source: Transforming Education for the Next Generation. A Practical Guide to Learning and Teaching with Technology. Intel Education. (Leslie Wilson)
- Develop a **shared vison** and **commitment**
- Promote **Deep learing**

CURRICULUM REFORM IN CROATIA

- The curriculum reform **started in 2015** in Croatia as one measure in the Strategy for Education, Science and Technology
- Expected to affect **all levels of education**, all subjects, cross-curricular topics and frameworks for assessment, special education and education of gifted students
- **Experimental implementation** of the new curriculum reform starts in the 2018/19 school year **School for life**
  - Teacher training in digital enviroment
  - Digital transformation of schools
- **Informatics** was planned to become an elective subject in all grades of compulsory education (previously addressed in grades 5-8) and an obligatory subject for two years in upper secondary education (Gymnasium).

COMPUTATIONAL THIKING vs DIGITAL LITERACY

- **Obligatory Informatics in grades 5 & 6 (11-12 y.)** in the 2018/19 school year
  - Equal opportunity for all
  - Reduce the digital divide
  - Include all stakeholders - Budin et al (2017)
- **Cross curricular** topic of ICT – digital literacy
- **Programming of micro computers**
  - Interdisciplinary approach 2017/18 - teachers of all subjects
  - Computational Thinking and Programming
  - Grassroots initiative and joint venture with private sector http://croatianmakers.hr/en/home/
- "**e-Schools**: Establishing a System for Developing Digitally Mature Schools (pilot project)".https://www.e-skole.hr/en
- **EU** technical **assistance** instruments for peer learning

INFORMATICS (COMPUTER SCIENCE) CURRICULUM STRUCTURAL DOMAINS

The new curriculum for organized in four domains:

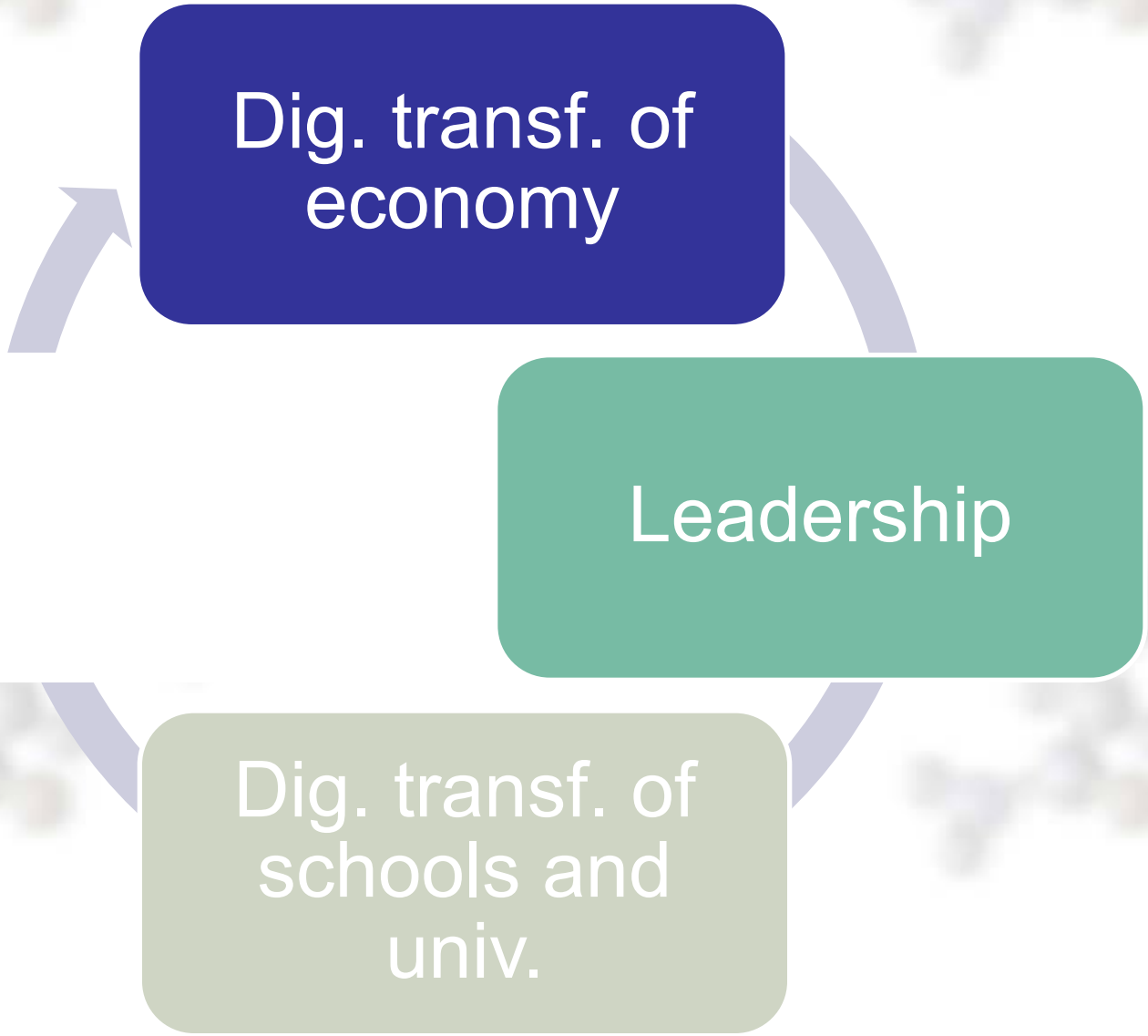
- e-Society
- Digital Literacy and Communication
- Information and Digital Technology
- Computational Thinking and Programming

HIGHER EDUCATION – PROGRAM AGREEMENTS

- **Third cycle 2018 – 2021 (or 2022)**
- **Program overall goal**: fight against fragmentation of HE and research
- Three-folded mission goals
- **Education**: reverent for 4th industrial revolution, EQF, future jobs
- **Research**: ICT supported, academia-industry,
- **The third mission**: Serve to society: innovation, transfer of technology (in which direction?)

CONCLUSIONS

- **Digital transformation** of education and science
  - developing the next generation of lifelong (deep) learners, innovators and global citizens
  - **Problem solving** skills is at the very heart of the **computational thinking**
- Educational technology initiatives bring **risks and opportunities**
  - Approaching technology deployment not as a device initiative, but an education initiative –in schools as well as at universities
  - **Equal** opportunities for all
- **Policy support** – inclusion of all stakeholders and encouragement of grassroots developments
  - Schools and universities working together with industry
- Bottom-up and top-down **leadership**
  - Critical planning decisions on a deep, evidence-based understanding of how to improve learning and teaching


Dig. transf. of economy
Leadership
Dig. transf. of schools and univ.

Thank you