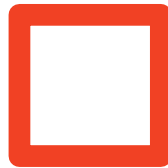




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Andrej Brodnik
UP FAMNIT & UL FRI



Between blue light and blue sky: the challenges of education in the digital age
May 10th, 2024, St. Stanislav's institution



Nomen est omen

- Holmes, W., Bialik, M., Fadel, C.; Artificial Intelligence in Education: Promises and Implications for Teaching and Learning. URL <https://books.google.si/books?id=tzO7wgEACAAJ>, 2019, Center for Curriculum Redesign.

The collision of three areas - data, computation and education - is set to have far-reaching consequences, raising fundamental questions about the nature of education: what is taught and how it is taught. Artificial Intelligence in Education is an important, if at times disturbing, contribution to the debate on AI and provides a detailed analysis on how it may affect the way **teachers** and **students** engage in education.

- subject to teacher's knowledge and skills



What is behind it

- Hannes Werthner, Erich Prem, Edward A. Lee, Carlo Ghezzi: Perspectives on Digital Humanism. Springer, 2022, <https://link.springer.com/book/10.1007/978-3-030-86144-5>

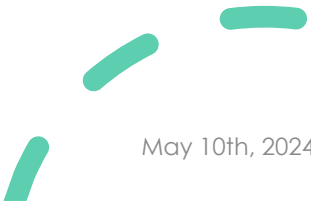
The second half of the 20th century and the 21st century are a time when, for the first time in history, man-made machines do not only perform physical work but also assist humans in intellectual work. The machine is becoming a human's coworker and partner, not just a tool.

- subject to our knowledge and skills



Looks like out of scope ...

1. Who had physics as a subject in primary school?
2. Who took physics in high school?
3. Who studied physics at college?
4. Who has never taken a physics course?
5. What is physics?



James Watt

Have you heard of him?

What important did he do?

steam engine

Do you know or have you ever known how it works?

wikipedia



Nikola Tesla

Have you heard of him?

What important did he do?

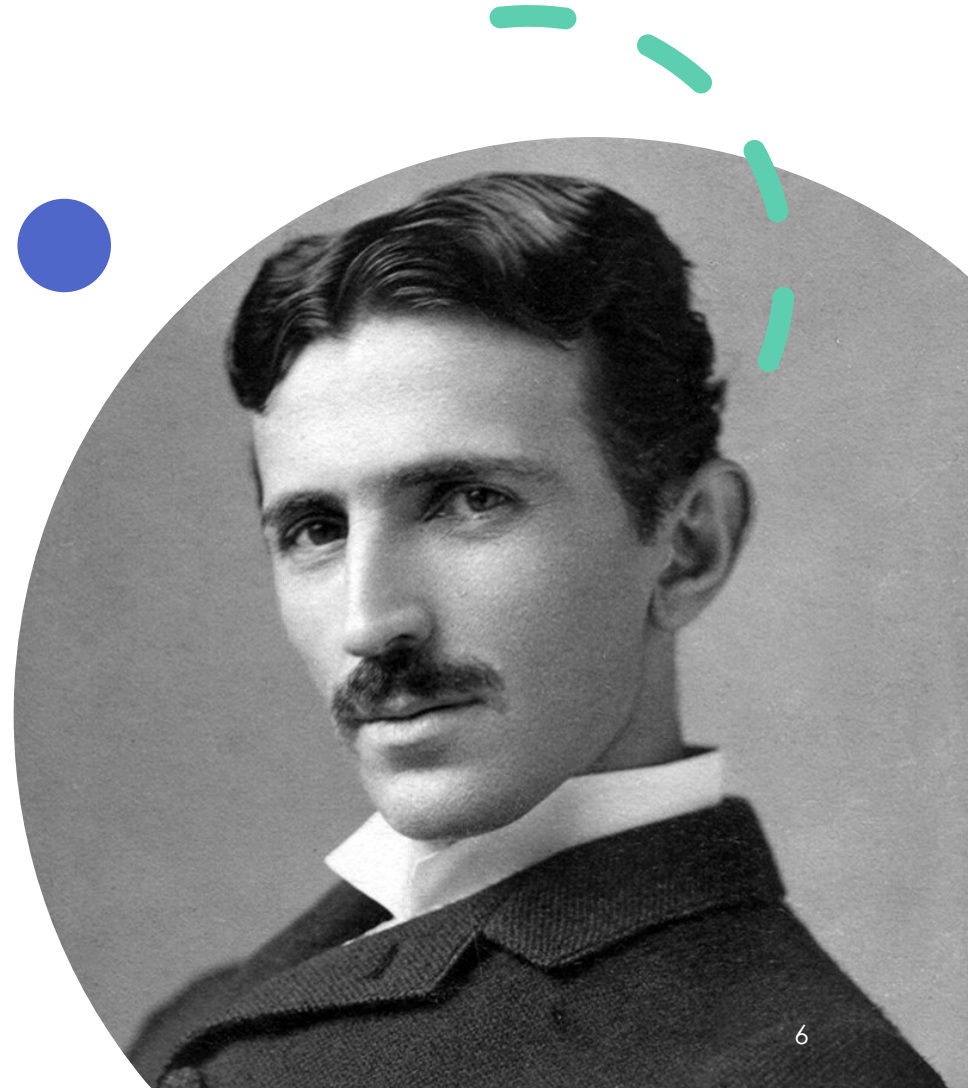
electrical engine

Do you know or have you ever known
how it works?

wikipedia

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John von Neumann

Have you heard of him?

What important did he do?

computer architecture

Do you know or have you ever known how it works?

wikipedia



John McCarthy

Have you heard of him?

What important did he do?

artificial intelligence (chess)
Turing award, 1971

Do you know or have you ever known how
it works?



ACM

Vinton Cerf

Have you heard of him?

What important did he do?

internet
Turing award, 2004

Do you know or have you ever known how it works?

ACM

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Martin Hellman

Have you heard of him?

What important did he do?

certificates
Turing award, 2020

Do you know or have you ever known how it works?

ACM





Kaj pa o računalništvu in informatiki (RIN) ...

1. Who had subject Computing in primary school?
2. Who took Computing in high school?
3. Who took the Computing course at college?
4. Who has never had a Computing course?
5. What is Computing?



“... we learn about the electricity at school,
but we do not have the subject
fundamentals of electrical engineering ...”

Emilija Stojmenova Duh, Studio at 17h, January 11th, 2022



What are we talking about?

1. Electrical Engineering

- electrical engines, lights, transformers, antenas, ...

2. Physics

- study of natural phenomena ...

1. Digital Technology

- computer, smart phone, ChatGPT, certificates, browser, ...

2. Informatics

- studies activities that require, has benefit, or is related with design and use of digital devices.

*ACM, Paradigms for Global
Computing Education*

Computer science is no more about computers than astronomy is about telescopes.

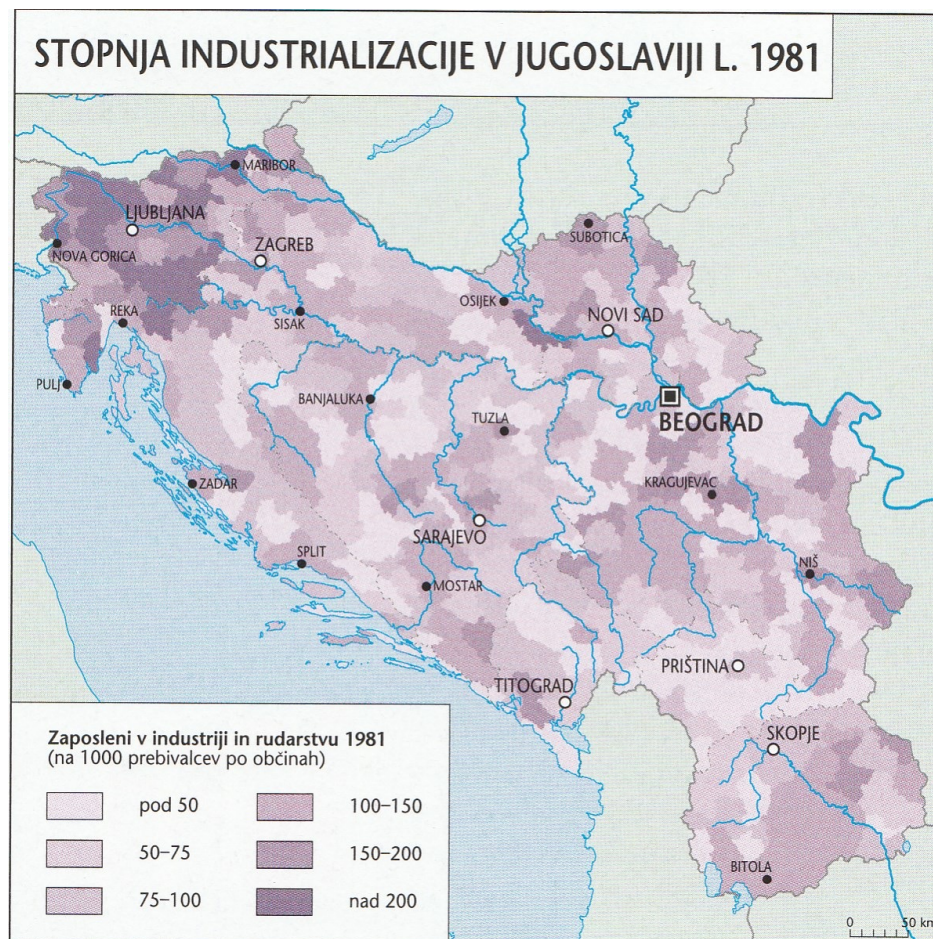
Edsger W. Dijkstra, Turing award, 1972

Slovenes in the former common state

- **represented 1/13 of the population,**
- **created 1/5 of GDP and**
- **generated a good third of exports.**

Michael Manske, Slovenia was a strong economic engine inside Yugoslavia, 2013, <http://www.rtv slo.si/news-in-english/slovenia-was-a-strong-economic-engine-inside-yugoslavia/323573>

Level of industrialization



Vilma Brodnik, Krepitev kompetenc strokovnih delavcev na področju vodenja inovativnega vzgojno-izobraževalnega zavoda v obdobju od 2018 do 2022

Literacy



Vilma Brodnik, Krepitev kompetenc strokovnih delavcev na področju vodenja inovativnega vzgojno-izobraževalnega zavoda v obdobju od 2018 do 2022

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Europe 1789

WikiMedia



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Education reform in Austria, 1774 (Allgemeine Schulordnung für die deutschen Normal-, Haupt- und Trivialschulen in sämtlichen Kaiserl. Königl. Erbländern)



May 10th, 2024

Maria Theresa
(1717-1780)



WikiMedia

WikiMedia

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Reform

- *Article 3*: all schools follow a uniform method or skill of teaching and implement a uniform set of subjects
- *Article 5*: lists and divides the subjects
 1. religious education;
 2. reading, writing and arithmetic;
 3. preparation for a profession or further education;
 - German syntax, the basics of Latin, history, geography, natural science, geometry and architecture.
 4. education of future teachers.

Simon Malmenvall: Za »srečo narodov«, Slovenski čas, 26. 3. 2024.

2. reading, writing and arithmetic

- The 3 **R**'s Get a **C**-for **C**ompute
New York Times, May 2nd, 1982
- Computational thinking
Seymour Papert in 1980 and
again in 1996
Jeannette Wing in 2006





2. preparation for a profession or further education

- one of subjects from natural science
- physics of 21st century
- necessary for any profession to be succesful, Nobel prizes in 2022:
 - *Physics*: Alain Aspect, John F. Clauser and Anton Zeilinger "for experiments with entangled photons, establishing the violation of Bell inequalities and **pioneering quantum information science**"
 - *Chemistry*: Carolyn Bertozzi, Morten Meldal and Barry Sharpless "for the **development of click chemistry** and bioorthogonal chemistry"
 - *Peace*: Ales Bialiatski, Memorial, Centre for Civil Liberties "... They have made an outstanding effort to **document war crimes, human right abuses and the abuse of power ...**" (<https://ccl.org.ua/en/tools/map-of-enforced-disappearances-in-ukraine/>)



What is at stake?

- creator or consumer of digital technology
- understanding or just following
- which side of a digital divide do we want to be
- wellbeing of our children:
 - ICILS 2013, creative solving of problems using digital technology (grade 8): Polish children 4 % successful, Slovenian children 0,4 %.

Hvala za pozornost / Thanx for your attention!

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***It is easier to move a cemetery
than to change a curriculum.***

Woodrow Wilson

[https://www.azquotes.com/quote/
1359810](https://www.azquotes.com/quote/1359810)

May 10th, 2024

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