Learning with keeping "question marks"

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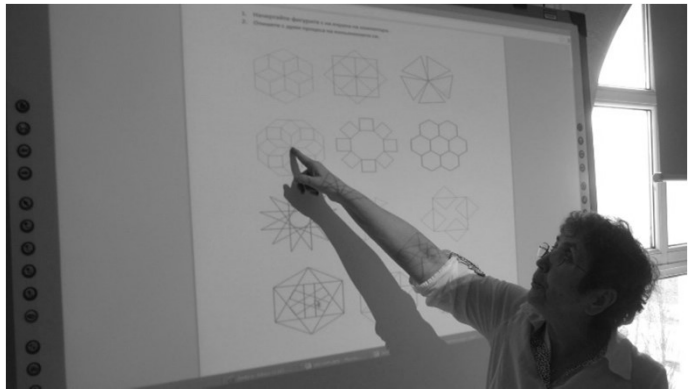
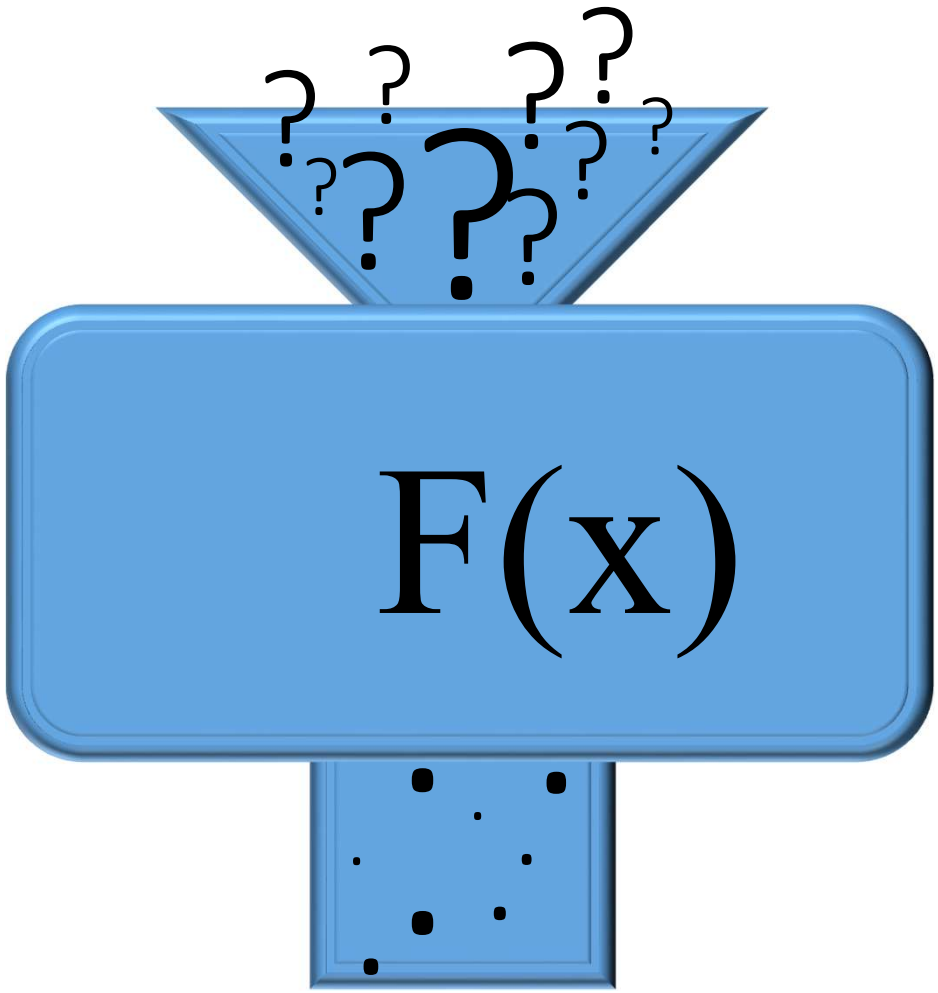
Acknowledgements

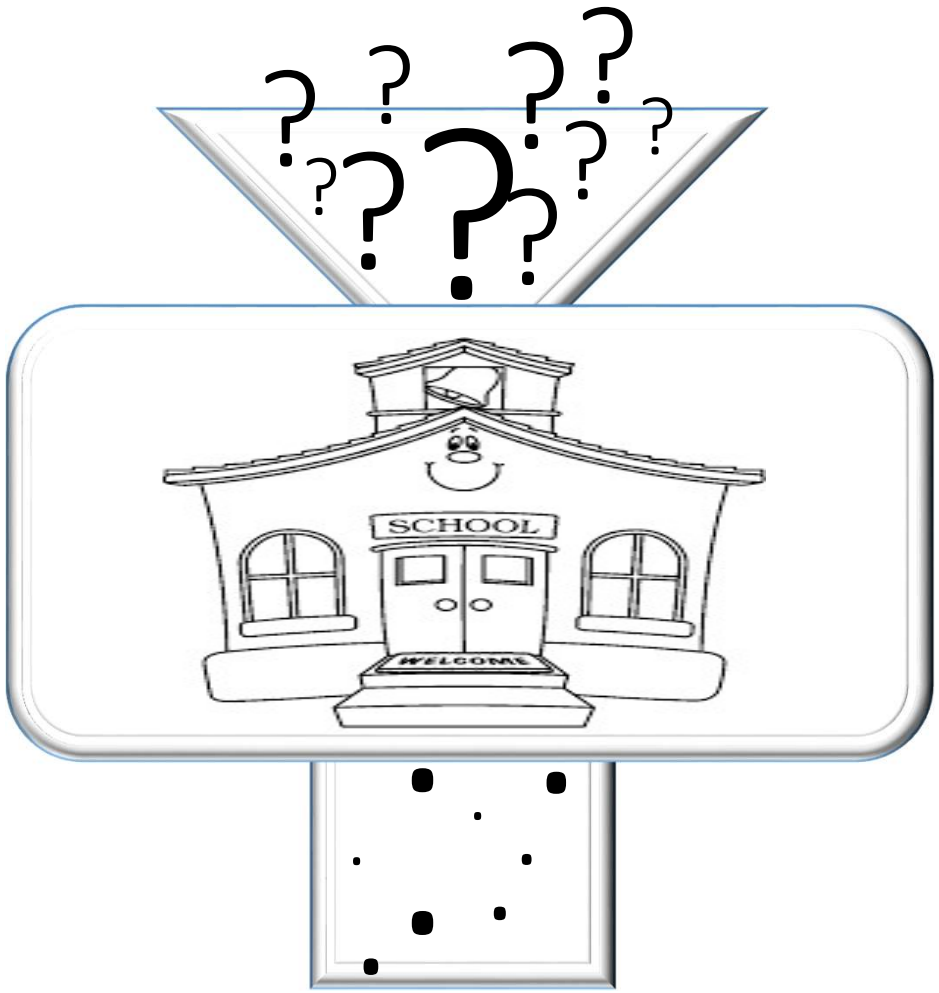
Thank's to my colleague Eugenia Sendova –
a veteran educator, promotor of enquiry-based education,
for sharing her experience and love
for keeping the children as question marks...



The kids enter … as question marks and leave as periods



A possible answer which is not very optimistic:



Postman & Weingartner, 1969: Teaching as a Subversive Activity

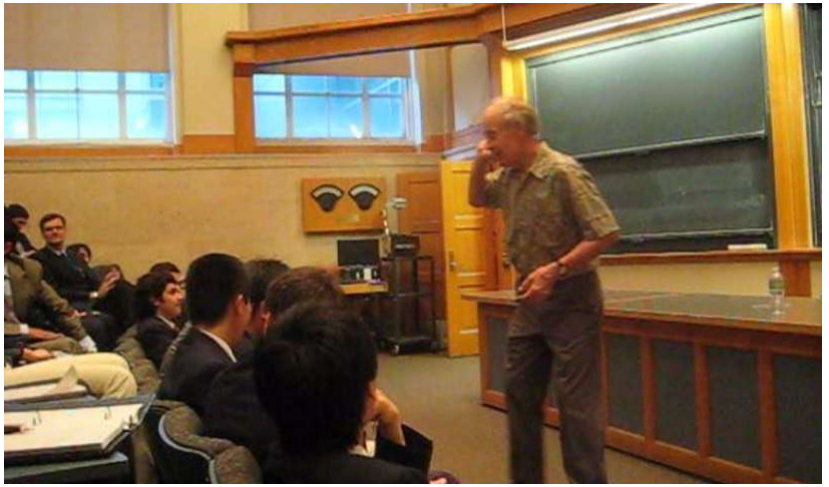
"?" -> "." -> "!"

... And at university students replace the period with an exclamation mark and get the feeling that they are ready to start working.

Masrchall et al, 2010:
The End of a 'Period': Sustainability and the Questioning Attitude

What does Dudley Herschbach think?

The small difference between the student and the scientist is how they react to a question they don't know the answer to



(Dudley Herschbach in 1986 - Nobeli prize in chemistry for contributions concerning the dynamics of chemical elementary processes)

Georg Cantor – doctoral speech, 1867:

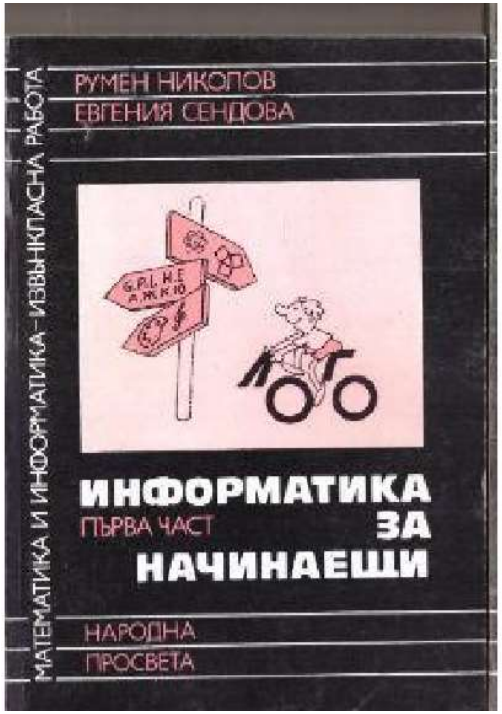
"In mathematics the art of asking questions
is more valuable than solving problems"

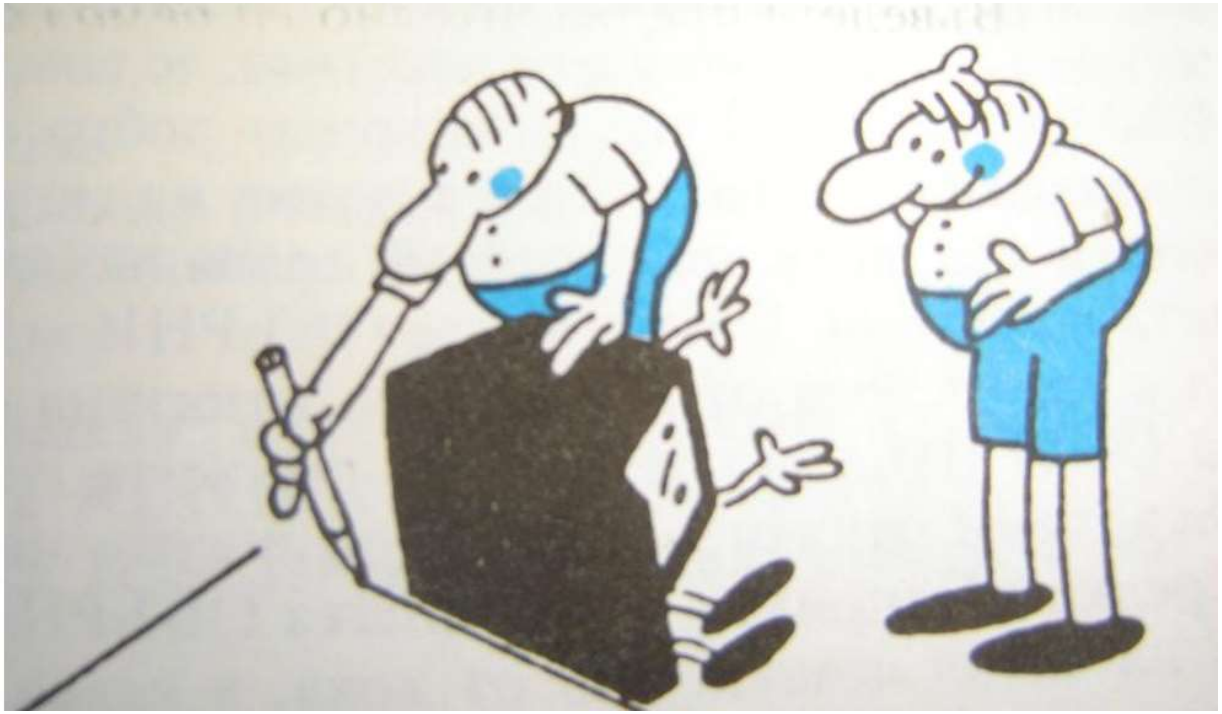
Seymour Papert, 1971:

"Teaching children to be mathematicians
versus teaching about mathematics"

"life is not about knowing the right answer...
it is about getting things to work,
about finding the best way to express one's creative ideas"

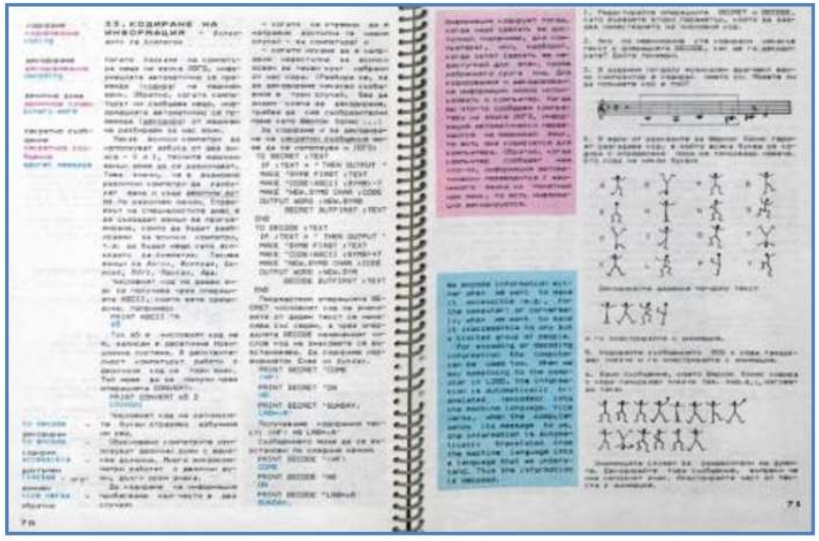
There is a world of difference between what computers can do and what society will choose to do with them…





From Informatics for beginners, textbook by R. Nikolov and E. Sendova, Artist D. Donev

1984 - textbooks "Language and Mathematics" (5th, 6th grade)



Designed to show the intersection of language study with mathematical thinking in the context of informatics.

Included problems on:

- translating from a natural to a formal language,
- algorithmic description of basic grammar rules,
- and ways to extend the Logo vocabulary to several languages.

Informatics notions	Actions
coding,	playing,
decoding,	creating educational games,
tree-graphs,	coding and decoding secret texts,
algorithms,	describing and executing algorithms in mathematics,
variables,	creating models of language, music and science phenomena
tables,	…
procedures,	
recursion,	
data,	
…	

Our natural language is best for conveying the semantics of an idea or situation;

algebraic language is best at expressing and transforming quantitative or structural relationships;

and computational language is optimal for describing processes and algorithms.

That – especially the last two paragraphs –
I feel like I learned in Sofia!

Paul Goldenberg (invited as an expert in mathematics and informatics education) wrote about the RGE approach

and all that was till the early 90-ties…

…

The Informatics was input as a subject in the compulsory school program.

The main reason of not achieving the expected good results was:

- The lack of sufficient number of qualified teachers, i.e. people who are good professionals from educational and informatics point of view

…

Since 2015 the Informatics was excluded form the common curricula and left only in the specialized schools.

Cathedral versus Bazaar

Eric Raimond about pros and cons of using two opposite ways of creation (in his case – programing code):

- Restricted to the specialized group.
- Created by the open society.

In our case:

- This formal including of Informatics in the compulsory curricula does not give the searched effect.
- On the other hand, the business needs more and more high quality IT specialists.

IT business:

- To wait the official education to build the specialists.
- To train their own specialists.

Svetlin Nakov: Telerik Academy … SoftUni …

2009 – Telerik Academy for software engineers:

- Free of charges.
- Within 6 months.
- The condition – failing of current exam brings you back to the beginning.
- The best students were invited to work in Telerik Ltd.

The result – most of IT companies started to recognize Telerik diploma equally with those from some universities.

2014 - Progress Software acquired Telerik company for $262.5 million.

Nakov moved to build SoftUni as a bridge between "the Cathedral and the Bazaar".

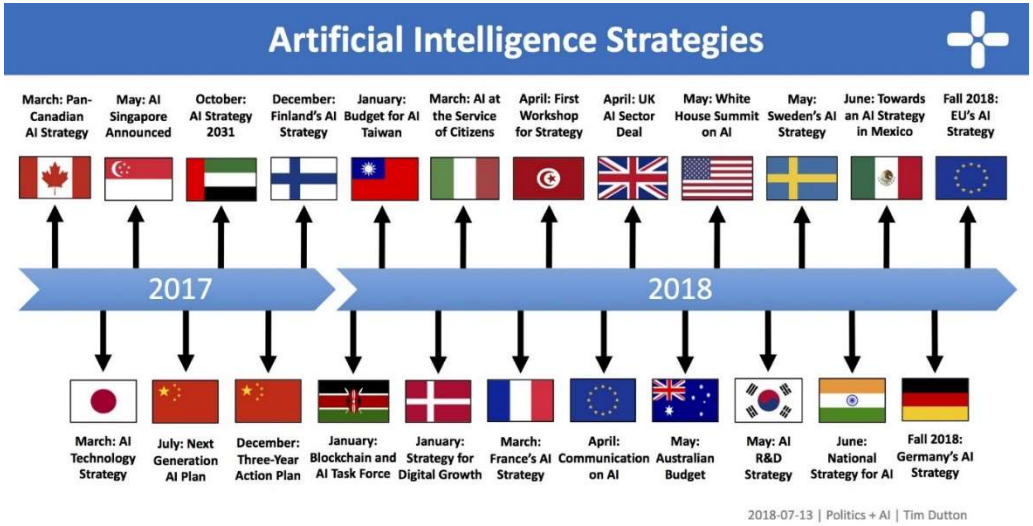
National program "Training for IT Career" 2018-2019

- Partners:
  - SoftUni Foundation
  - Ministry of Education and Science
  - National industrial IT associations
- Goal: vocational education for the profession "Applied programmer" of pupils from all over the country in extracurricular form
- 5 centers (Prof. gymnasium + University)
- Program – Programming, OOP, Algorithms and Data Structures…

2019 – Vision for Bulgarian AI Strategy

- Enablers: software 2.0, service robotics, drones, HCI in Bulgarian
- Consumers: healthcare, agriculture, public services

Most important – AI and education (in both directions)



Tim Dutton et al, Building an AI World, Report on National and Regional AI Strategies, 2018

Institute of Mathematics and Informatics
and
Union of Bulgarian Mathematicians

Competitions and Olympiads

- Mathematics - IMO
  - Since 1959 (54 gold, 114 silver; 108 bronze)
- Informatics
  - The first IOI: Pravetz, Bulgaria, 16-19.05.1989
- IT
- Mathematical linguistics
  - The 1st IOL: Borovets, Bulgaria, 6-12.09.2003

Needs to be successful in the competitions:

- In-depth knowledge – OK
- proper "competitive attitude" - ?

Many students fail to show their qualities through racing.

They are able to find a witty and original solution to the tasks by asking themselves questions, formulating and exploring different hypotheses, but after the race is over.

The discovery and care of students with such abilities is the true mission of HSSIMI.

Funded in Sep. 2000, by Union of Mathematicians in Bulgaria, Foundations "Eureka" and "St.st. Cyril and Methodius" and IMI-BAS

VivaCognita

VIVA Cognita platform is a partnership project of

- Institute of Mathematics and Informatics
- Union of Bulgarian Mathematicians
- VIVACOM (one of the Bulgarian telecoms)

The objectives of the project are:

- Creating a web platform and deploying technology to enable the development and implementation of a variety of educational initiatives

initiatives

- Online courses
  - For students
  - For teachers
- GeoGebra models for virtual training
- Online competitions
  - VIVA Mathematics with a Computer
  - VIVA Patriotism

- Main goal – virtual education-related community

IMI – national contact point for Scientix in Bulgaria

EU projects "Scientix" promote and support a Europe-wide collaboration among STEM teachers, education researchers, policymakers and other STEM education professionals

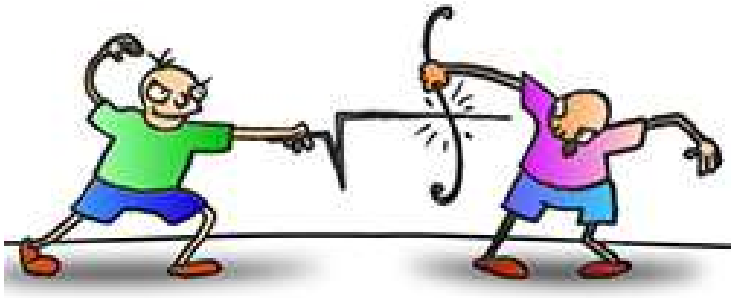
- 2009-2012 – online portal to collect and present European STEM education projects and teaching materials
- 2013-2015-2019 – to reach out to national teacher communities, and to contribute to the development of national strategies for wider uptake of inquiry-based and other innovative approaches to science and maths education

SCIENTIX
The community for science education in Europe

IMI students classroom

A demo of learning environment where the students can:

- Make experiments
- Formulate conjectures
- Test, refine and prove them
- Acquire new knowledge, i.e.
- Discover their own America



24th May – Day of Bulgarian Education and Culture, and Slavic Script

The challenge of being a TEACHER, being and staying ...

The challenge of giving – knowledge, experience, skills, yourself ...

The challenge of continuing to fight – with the system, illiteracy, even sometimes with yourself...

The challenge of discovering roses and diamonds in the mud and make them shine and smell ...

That's it!
Some are just born to be TEACHERS ... for a lifetime ...

Kr. Petkova