



Future of Education - Preparing our Students for the Age of Robots

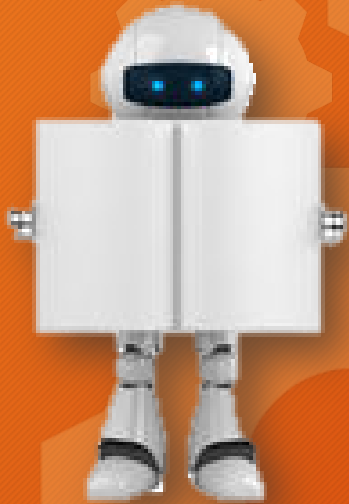


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Topic outline



- A Difficile Mission: Defining What a Robot Is?
- From Artificial Intelligence presence in our world, today ...
- ... to advantages of using robots in our life ...
- ... and disadvantages
- Robots and the future of workplaces
- Statistics talks...
- Future trends for robots world
- Characteristics of human activities that can (or not) be automated
- Students facing with the new technologies
- Challenges in future student's education
- Conclusions



A Difficile Mission: Defining What a Robot Is?



Having a wide variety of robot types, it is difficult to provide a single definition for the term "robot".

- ❑ *Michael Milford, Queensland University of Technology* said: "A robot is a machine that senses the world around it, thinks and acts..." but this definition is not satisfactory, as an air conditioner machine fits that definition. So we must extend it to: "A robot is a machine that senses the world around it, thinks, and acts in some physical/mechanical way in the environment around it"
- ❑ "... a robot is a physically embodied artificially intelligent agent that can take actions that have effects on the physical world" (*Anca Dragan, from University of California, Berkeley*)

... but shouldn't we also add the ability of robots **to communicate with humans** in the definition? ... or **to communicate with each other** ... or maybe **to collaborate**?... with other robots or even with humans?

Maybe these features are not fully functional today, but their future is so close!

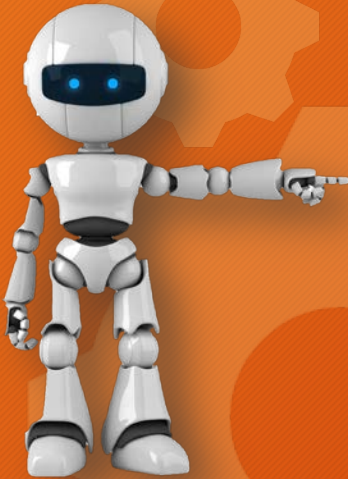


From Artificial Intelligence presence in our world, today ...

We are already using a lot AI in our life, with a growing influence in the coming years. Here are some examples:

- ❑ AI assistants already take more and more often orders from human people into a lot of areas: banking/personal finances, trip advisors, shopping suggestions, media content suggestions, personal activities schedule etc.
- ❑ we can observe increasing presence of self-driving cars on our streets, which have a successful traffic integration, with very few lacks in driving experience
- ❑ we already interact with AI robots on the phone conversations or on the Internet on-line customer support, with a chat-bot
- ❑ IOT devices are all over in our pockets, in our houses, in our cars, even on our pets ...

... and we are delighted with that ...



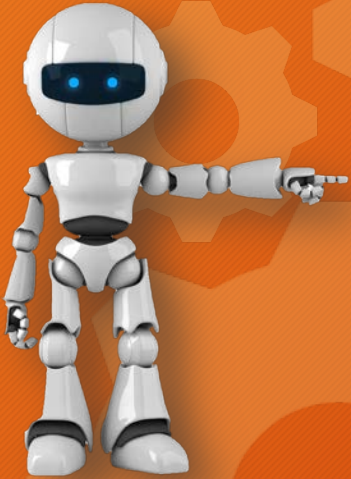


... to advantages of using robots in our life ...



Robots capabilities in our world:

- 👍 successfully implementation and efficiency into automotive industry and manufacturing;
- 👍 searching and rescue missions for survivors in spaces and environments inaccessible to humans;
- 👍 using robots in military missions or in aeronautical or space missions;
- 👍 they can work 24 hours / 7 days per week without complaining of tiredness, don't get bored or requesting salary increase or medical assurances;
- 👍 robots are faster and more precise than humans;
- 👍 can become excellent surgeons in the medical field.





... and disadvantages

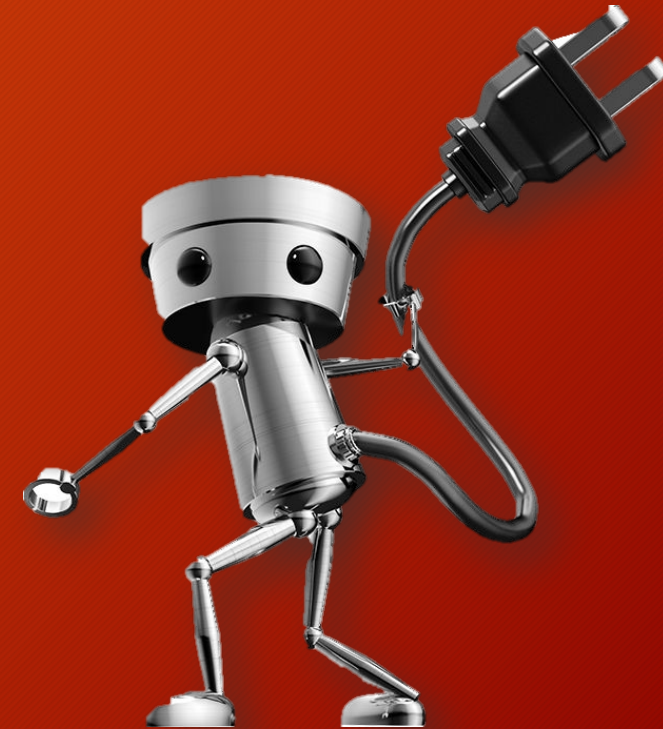


- 👉 the robots can easily replace humans in some of their activities (in the present, this replacing risk is not so obvious, but as technology advances, in some domains humans will become inferior to robots...)
- 👉 the humans may become more and more addicted to robots, losing their abilities and even mental capacities;
- 👉 high costs for the maintenance and repair, difficulties in updating software and/or hardware to suit the changing environments;
- 👉 robots are not smart enough to improve their operations outside of their predefined code program, they don't have consciousness or emotions and this limits capability to interact and collaborate with humans.



Robots and the future of workplaces

- ❑ Computer technologies have a very fast evolution and the new technologies imply an expanding scope of robots applications with significant implications for human jobs and organisational structures of companies.
- ❑ In automation domain, the AI programming techniques enable applications to analyse enormous data sets, find different patterns and make predictions, offer the results faster and more accurately in their processes.
- ❑ In robotics, the combination between these software developments and hardware improvements such as advanced grippers and sensors will improve the robots in future ability to work alongside humans, instead replacing them.
- ❑ So, the future workplaces can be a successful and very efficient combination human-machines.

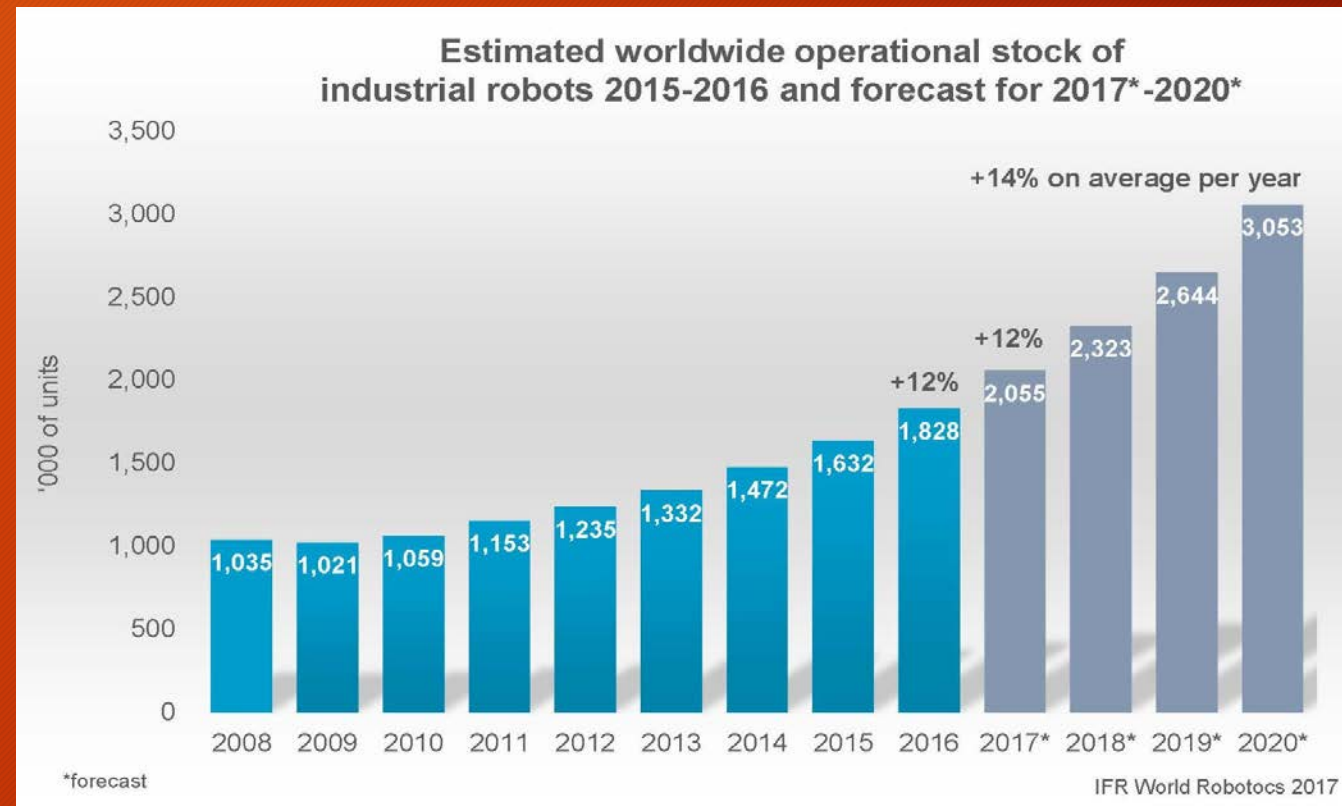




Statistics talks...

- According to the International Federation of Robotics (IFR), more than 3 million industrial robots will be in use in factories around the world by 2020. This means that the operational stock will more than double within seven years (2014-2020).
- As figures from the International Federation of Robotics show, sales of robots are increasing year-on-year, with a 12% increase in 2016 over the previous year. We can observe an average annual growth rate of 14% between 2017 and 2020.

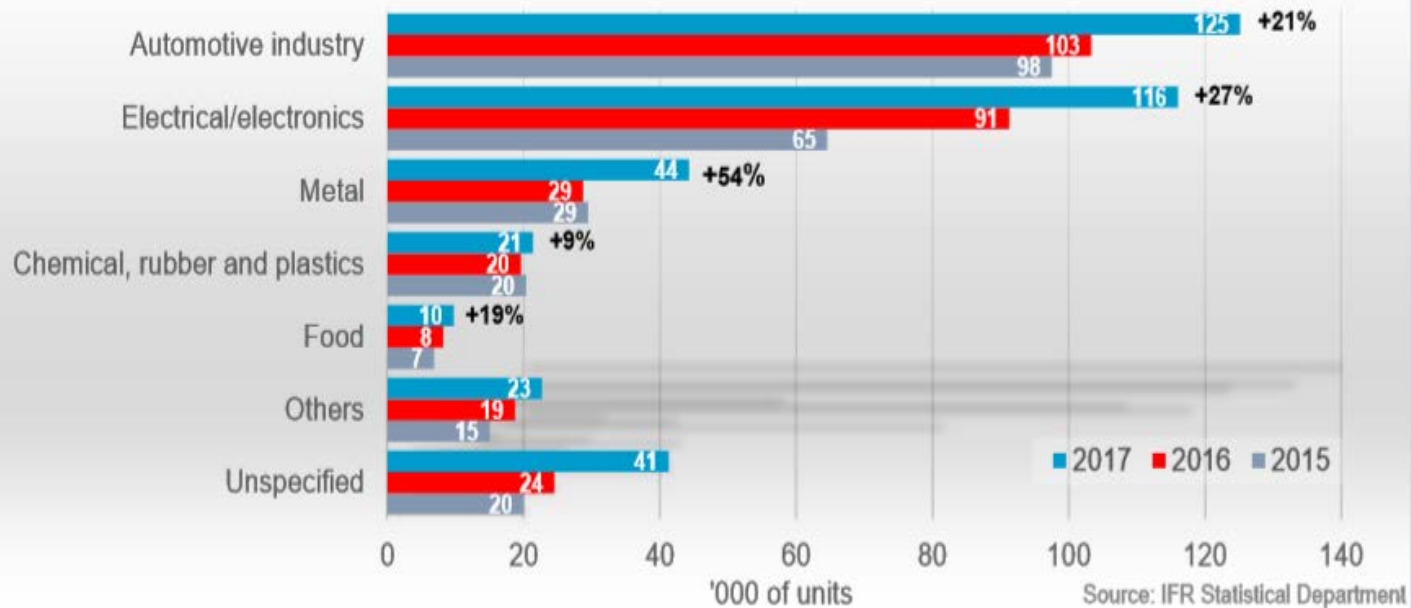
(IFR Report - *The Impact of Robots on Productivity, Employment and Jobs*, Frankfurt, Germany, 2017).





Statistics talks ...

Estimated annual supply of industrial robots at year-end
by industries worldwide 2015-2017



We can observe the same evolution of industrial robots supplying in specified domains, the overall conclusion indicates that in almost all surveyed domains, the potential for robot installations in the general industry is tremendous. It is also considerably high in the automotive industry among the emerging markets and in some traditional markets as well. Moreover, continued necessary modernization and retooling also guarantee further robot investments in already highly automated countries.



Future trends for robots world

- Collaborative robots, IoT and Machine Learning/AI will lead robotics in the coming years.
- The new generation of lightweight robots enables man and machine to work closely and safely together - without fences.
- Robots will acquire or adapt new skills through learning processes.
- Smarter robots with a "brain" in the cloud as a basis will benefit from big data and collective learning.
- Robots improve the quality of work by taking over dangerous, tedious and dirty jobs that are not possible or safe for humans to perform.
- Robots assist humans in the workplace





Potential benefits of AI in Education

Teachers:

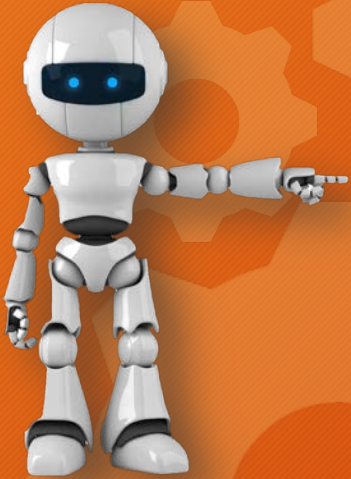
- spend more time with students on a meaningful, individual level, as the time grading coursework and lecturing would be greatly reduced
- guiding how a weak area can be improved
- students learn their lesson independently and then come together, with the teacher's help and supervision, to apply that knowledge while interacting with each other





Students facing with the new technologies

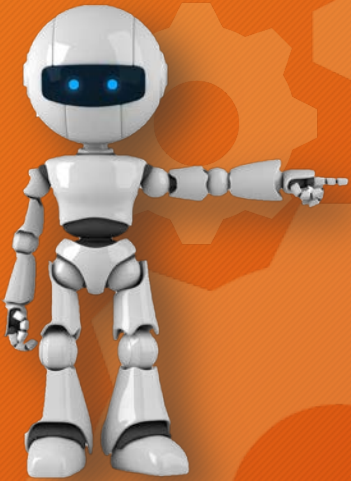
- Our students are young, smart and should be eager to know and understand as much as possible, to get to the top as fast as possible, have a life as beautiful as possible and full of opportunities. In fact, this is normally the dream of any young person, as we remember, but today generations need to be more motivated than in the past.
- Our young students can now benefit of advanced technologies that give them the opportunity to access any kind of information very quickly, to communicate each other very easily and from anywhere and can get help with what they do from a large variety of increasingly intelligent electronic devices.
- People's activities are becoming more and more automated today, starting from using simple math calculators, increasingly powerful computers, VR devices, AR devices, smart phones, smart watches, smart self-driving cars... smart devices are everywhere around us...
- ... but as these machines become smarter, is the same thing happening with the people?





Students facing with the new technologies

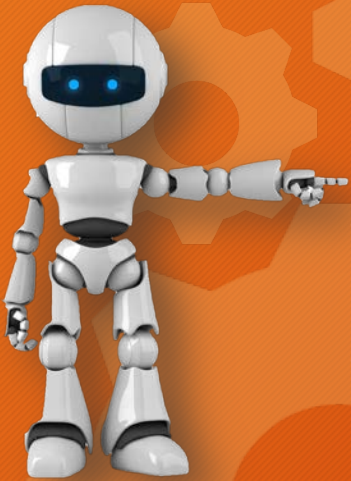
- Although at first sight the use of intelligent devices seems to be a good thing and indeed it is, we must pay attention to the fact that it is possible to forget many simple activities.
- A good example - simple communication between people. Our students communicate very much via electronic devices. Many times, they “communicate” too much, instead of fulfilling their study tasks or even forget to live their social life.
- In this way, students become introverted, it is increasingly difficult for them to communicate directly with other people, they prefer to interact to each others through electronic environment.
- At the same time, empathy among the young people disappears, thus making a team for the realization of real world tasks is becoming more and more difficult.





Students facing with the new technologies

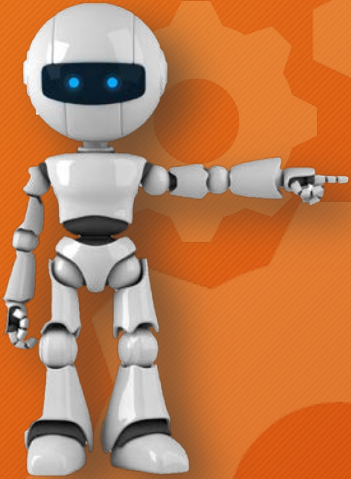
- New technologies provide complex information to our young people, and in fact this information might often represent the final answer to their problem solving.
- Many times young people find these solutions looking for resources from the Internet, but they have great problems in making connections between the elements of logical reasoning.
- In fact, they find out somehow the solution for a problem, but they do not know how to apply it, and this cannot be good at all.
- Students have often an impatience in finding out the answers, there is a decrease in the capacity to judge the logic of solving problems, some of them quite simple.
- The fact that young people have access to information is a good thing, but they have to learn to build a problem solution rather than find the final answer.





Challenges in future student's education

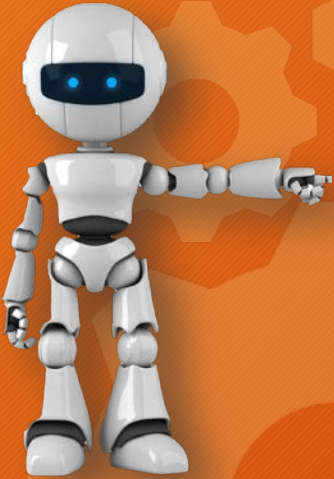
- Our universities are not yet successfully preparing students to succeed in a world where intelligent robots have transformed the workforce.
- Education system should be adapted to “focus on things that machines will be less good at for longer,” rather than skills that are rapidly becoming obsolete.
- Teachers must adapt their teaching methods and refine the knowledge transmitted because most of them are based on easy reproducible elements that can be better done by machines than any human.
- Students should spend more time working on problems collaboratively, because in the future many professionals will be required to collaborate with robots as well.





Challenges in future student's education

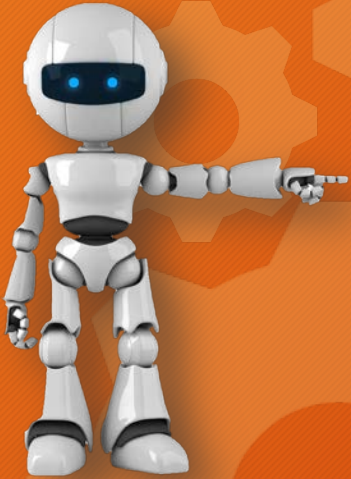
- Education can become more successful by focusing on endowing students with reasoning traits that use a wide range of creation-oriented techniques such as brainstorming, mind mapping and project-based assignments.
- Students must be determined to have a desire to seek out knowledge, to create new ideas, and to achieve more complex tasks.
- Teachers must adapt their teaching methods to focus less on learning or straightforward calculation and more on acquiring skills like critical thinking, communication and leadership.





Challenges in future student's education

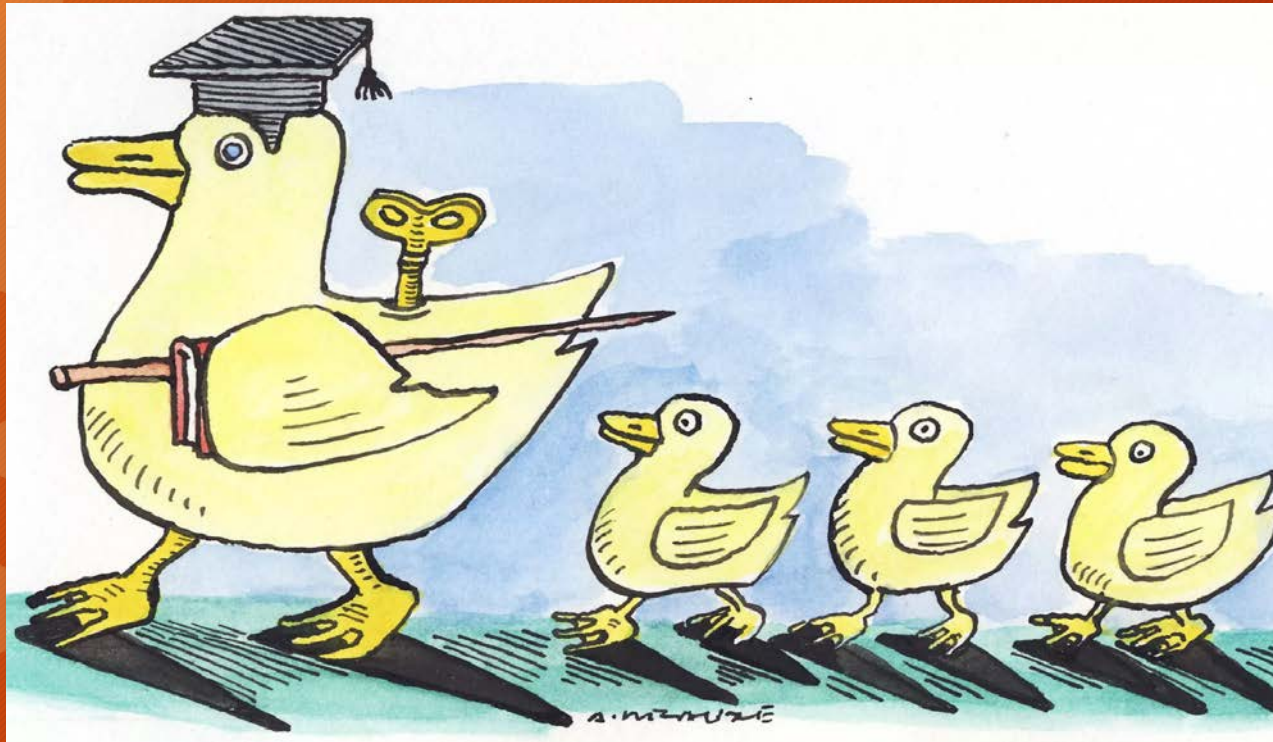
- It's obvious that humans can't compare with intelligent machines in computing and processing data, but human ingenuity and creativity remain unmatched.
- We should make the most of that fact, and give young people the opportunity to use their advantages as effectively as possible.
- The necessary attributes of humans must be based on values, beliefs, independent thinking, teamwork, freedom of creation and caring for others.



Future: Automated Teaching Machines???

- 'Inspirational' robots will begin replacing teachers within 10 years... - Alt School teaching paradigm
- ~~Grouping children by year~~ - robots will enable pupils to learn new material at their own pace
- Teachers - "overseers", monitoring the progress of individual pupils, leading non-academic activities and providing pastoral support
- Teachers should be empowered, not replaced!

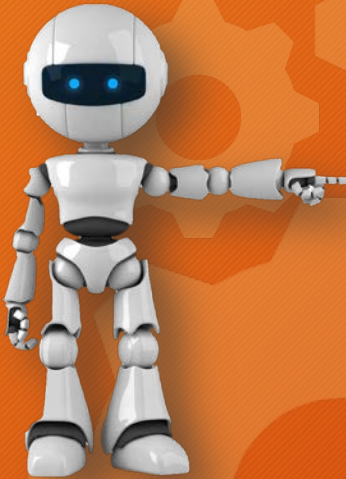
In an age of robots, schools are teaching our children to be redundant





Conclusions

- ✓ The AI-driven revolution might promote its winners and losers. To join winners is vital not just to avoid being replaced by the new technologies, but also to capitalize on their new emerging opportunities.
- ✓ We, teachers, must adapt our approach of preparing the students for this future, by focusing in our teaching curricula on how to be creative, how to better control these machines by focusing on creating unique values, that cannot be easily reproducible and computable by intelligent robots.
- ✓ In order to ensure our students a future job, education must stress the human characteristics: creativity, empathy, collaboration and criticism.



Thanks for your attention!

