At the World Economic Forum Annual meeting 2018, leaders of the world’s largest organizations emphasized that educating future generations and reskilling programs of today’s workers should focus on soft skills because humans will never be able to compete with the hard skills of technology in the near future. Having a closer look at these soft skills shows that they all require a deep understanding of logical reasoning. Which human competences are we betting our future on exactly, and how “soft” are these skills?

Our observations

- Reports from prominent sources such as the World Economic Forum (WEF), the Organization for Economic Co-operation and Development (OECD) and the European Parliamentary Technology Assessment (EPTA) are trying to connect the dots between labor markets, economies, education systems and reskilling programs worldwide in order to unravel how we can prepare ourselves and future generations for the disruptions that come with the Fourth Industrial Revolution.

- The knowledge-based approach of traditional education will “fail our kids”, says Jack Ma, as do many other prominent voices in the labor market, such as Minouche Shafik, director of the London School of Economics, and Fabiola Gianotti, particle physicist and director general of CERN. They agree that children should be taught “soft skills”. These soft skills are explicitly supposed to be made useful within the context of the Fourth Industrial Revolution, i.e. in collaboration with technology, not isolated from it.

- In the context of 21st century skills, the University of Twente carried out an extensive literature review and identified seven core skills, which are fundamental for performing tasks that are necessary in a broad range of occupations in the near future: information management, critical thinking, creativity, problem solving, collaboration, communication and technical skills. They added five contextual skills, which are required to make use of the core skills: self-direction, lifelong learning, ethical awareness, cultural awareness, and flexibility skills. Only technical skills, the skills to build and use (new) devices and applications, can be characterized as ‘hard skills’, the rest are all considered soft skills.

- The definitions that are given in reports of aforementioned sources, as well as the examples of applying these soft skills all presuppose a deep understanding of logical reasoning.
Although the various lists of 21st century skills that feature in reports from prominent sources are not exactly identical, the overall message is clear. Aside from technical skills, they focus on ‘soft skills’. Soft skills might easily, and to some extent rightfully, be associated with competences that are rooted in our emotions or imagination, such as communication, ethical and cultural awareness or creative and social skills. However, a closer look at the definitions and applications of the aforementioned soft (core) skills reveals that they all presuppose a deep understanding of logical reasoning. Logical reasoning is argumentation conducted or assessed according to strict universal principles of validity, i.e. proposition logic and predicate logic.

Critical thinking, for example, is defined as the skill needed to make informed judgements and choices about obtained information and communication using reflective reasoning and sufficient evidence to support claims. This includes asking and answering questions related to a problem, judging the suitability of a source in relation to a given problem, invoking arguments for claims based upon their consistency with other knowledge claims and linking ideas, facts and notions. Problem solving, to give another example, is defined as the skill needed to cognitively process and understand a problem situation, combined with the active use of knowledge to find a solution to a problem. Without logical reasoning, these cognitive steps are not possible. Even creative skills, as defined in the context of 21st century skills, presuppose logical reasoning because they require an agent to generate new or previously unknown ideas, or treat familiar ideas in a new way and transform such ideas into a product, service or process that is recognized as novel within a particular domain.

The need for logical reasoning is not surprising. We are increasingly working side by side with technology and our contributions therefore need to be transferable into the language of technology. And technology, by definition, works according to logical patterns. Soft skills are therefore not as soft as they might appear at first sight. This does not mean that our emotional and imaginative skills will be less important in future skills, it means that these competences need to be deeply connected with logical reasoning.  

Implications

- Logical reasoning is not yet implemented as an individual topic in education systems of primary and secondary schools. Even in universities, proposition logic and predicate logic classes are only found in philosophy faculties, not in law, economics, communication sciences etc. And even if they were, the explicit connecting of logical reasoning to soft skills, such as communication, problem solving and creative thinking, is new (at least outside academic philosophy) and must be developed further in order to be made useful in the future of work.

- Some may feel that computers will make human tasks inherently easier, as they will do all the “hard work”. The contrary may be true. Getting truly meaningful output from digital systems, on ever more complex problems, will require a deep understanding of the logical reasoning taking place inside technology.

- A thorough education in logical reasoning connected to our creativity, information management, communication skills etc. might not only be necessary for putting technology to work and assessing meaningful output. It might also become important in order to maintain a healthy disposition towards the overwhelming amount of (unexpected) information we will be exposed to through the ever-increasing results of data collection.

Connecting the dots