Industry 4.0, Education and 3D Printing

How are they related?

To meet the new and emerging challenges of the 4th Industrial Revolution, the school needs to implement practices that empower students with the necessary skills to meet these new challenges.

The 4th stage of the Industrial Revolution is currently in force, named in different ways - Industry 4.0, Industrial Internet of Things (IIoT); Smart manufacturing; Digital Transformation - but always with the same purpose, to connect the whole production process.

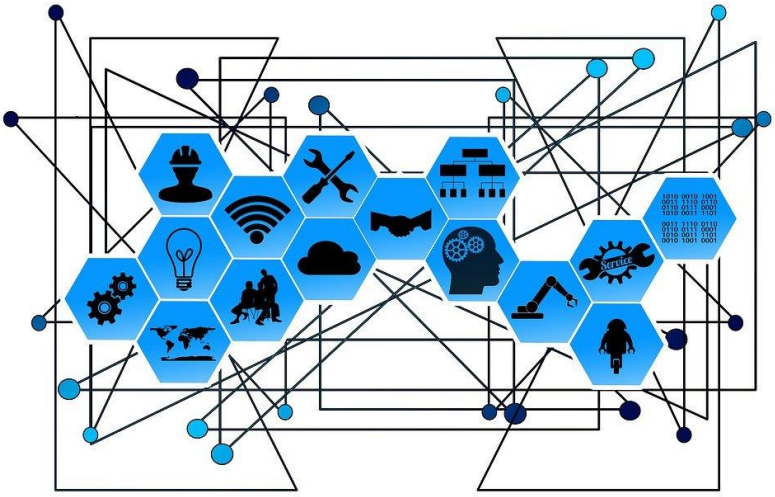

Figure 1 – Industry 4.0 Interconnection. Source: https://*pixabay*.com/pt

Industry 4.0 presents as main advantages:

Virtualisation - the interconnection between sensor data with virtual and simulation models allow virtual copies of Smart Factories to be created;

Decentralisation - capacity of cyber-physical systems to take decisions autonomously and local production capacity with technologies such as 3D Printing;

Service orientation - use of software architectures oriented to services allied to the Internet concept;

Modularity - production according to demand, coupling and decoupling modules in production. It offers flexibility to change the tasks of each equipment according to need;

Interoperability - the ability of Cyber physical systems, humans and factories to communicate with each other through the Internet of Things (IIoT) and the Internet.

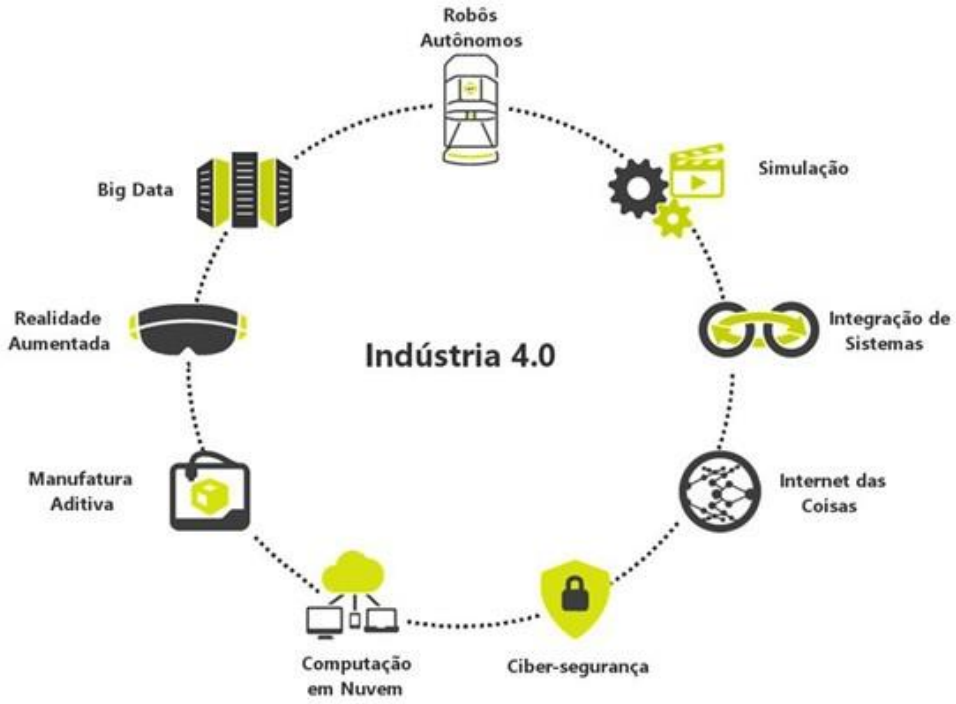

Figure 2 – Technological concepts inherent to Industry 4.0. Source: https://hub.pme-digital.pt

Industry 4.0 comes with changes in production and business models allowing to create responsive and adaptive systems in the face of the highly dynamic requirements of today's market. This concept encourages the raising of product requirements, as well as providing a more competitive environment for which the industry has to be more and better prepared. This is made possible by the definitive and inevitable entry of Information and Communication Technologies (ICT).

The education system has an important role here, as its main objective should be to adapt the training contents of the national education system to the new technologies and to promote measures for requalification and training of students, endowing them with skills appropriate to the needs of companies.

Qualifying people and organisations to meet the challenges of the 4th industrial revolution should be the goal of education by excellence along with providing teachers with the right pedagogical tools.

Several changes in education have been outlined as the need for the teacher to innovate pedagogical practices and the importance of digital technologies in the teaching process. There are initiatives in this direction, among which stand out: collaborative environments (such as the one proposed by this project - ITE) and the introduction of technologies in teaching and research activities, such as the 3D printers.

Having a 3D printer in the classroom will allow students to have access to this technology that promises to change manufacturing processes in the coming years. Young people will be encouraged to create their own projects, from conception to the final object. We also consider that 3D printing can engage and develop several capacities: stimulate students and teachers, strengthen commitment to science, technology, engineering and mathematics, focus on creative problem solving, student initiative and cooperation. The greatest benefit is the quality of learning, generating more capable and qualified students to work in a future profession. This knowledge can represent an enormous gain for the person's entire life, not only personal but also professional.

For the student, it will mean a change of mentality regarding the need for lifelong qualification. It is necessary to bring the education sector and the business sector closer together.

You will find more information about 3D printing, including applications, trends and its benefits for Education in the “3DP TEACHERS’ GUIDEBOOK”. Make sure you are following the “3DP TEACHER - implementation of 3D Printing in future education” project’s Facebook page to be the first to know when the guidebook is published on project’s website.

Sources:

https://hub.pme-digital.pt/biblioteca/documentos-estrategicos-para-portugal/