

# experiencies



by Silvia Planella

The role of STEM education  
as hope for the future in  
a complex and uncertain  
world

**STEM education at school to  
encourage technology careers**



oculus

**T**he pandemic has precipitated the advance of the technological revolution by 5 - 10 years: it is a process coming at us like a tsunami. We have only two ways of dealing with it: either turn our backs on them or join them.

It is clearly the beginning of a new productive, economic and social model in which STEM (Science, Technology, Engineering and Mathematics) play a key role.

The business network needs to adapt to change and, for this reason, professionals with STEM profiles are required more than ever.

However, this disruption comes up against a lack of STEM talent and a large part of society missing resources to adapt to this change. Therefore, it is necessary to project a community ready for a technological future and, on the other hand, to promote technical careers to guarantee people who will lead this change.

To this end, STEM education must be promoted from early childhood throughout the school stage, in a cross-cutting and integrated manner, with an applied and multidisciplinary approach. In other words, we must move from teaching STEM subjects separately to teaching them across all academic subjects. We must eliminate single-subject learning and replace it with knowledge by solving complex real-world challenges through creativity, research, innovation and, above all, the integration of various disciplines.

First of all, education professionals need to be aware of these new dynamics to implement them in the classroom. On the one hand, it will be achieved by expanding the knowledge of STEM in the faculties of education and, on the other, by training both teachers and professors in the new

applied and multidisciplinary learning.

It is a good illustration of a teacher's difficulty in guiding or explaining a child or adolescent what they can do if they don't know, for instance, the branches of engineering studies and the related professions. It is also difficult for children to believe in their possibilities if the family does not support them in gaining self-confidence.

Firstly, STEM studies must be demystified from the *nerd* culture, breaking the idea that only teenagers with the best grades may think they have the potential to pursue university studies related to STEM. It is vital that, from early childhood, a vocation for these disciplines is boosted practically and experientially. Students should be approached based on their interests and abilities rather than on their curricular qualifications. Motivation and interest are most important to ensure academic success.

Actions are needed to make STEM and its professional opportunities known to the new generations and their environment, specially promoted by the Administration or by companies and entities in the sectors.

It is also essential for society to eradicate preconceived labels according to the type of training. There are no higher category studies than others, but somewhat different paths to particular professions. For instance, directing students to their vocational training or the Baccalaureate based on their academic records rather than on their interests may be a mistake: the students themselves should decide where and when to finish their training to prepare them for their entry into labour market.

On the positive side, it is worth mentioning that actions from

different bodies directly impact promoting this change. Two cases are the talks given and organised by polytechnic and science universities to explain to secondary school students the existing university degrees and their access routes; also the sessions offered by professional associations to help students learn about specific professions.

An example of the latter is the *Let's talk about engineering*: free of charge lectures in Girona's secondary schools and organised by the College of Graduate Engineers and Technical Engineers of Girona, from now on, the College. Specifically, during this academic year, it has been given to thirty groups in twenty secondary schools and has reached around 700 teenagers.

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Therefore, schools must include this type of action to bring STEM disciplines closer to the practical application they will have in the future in the world of work and for students to have more information to help them decide which speciality or option to choose.

But in order to awaken vocations, it is also necessary to act from Primary School. And, in this sense, the College has been committed for some time now to promoting actions that work in this direction, such as, for example, participating in the FOEG campaign. *When I grow up, I want to be like you*, where business people

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or engineering professionals visit schools to explain the profession or the preparation of an event with STEM workshops for children for Mobile Week in Girona.

The College has also promoted actions carried out by the TEG (Engineering Board of the counties of Girona) such as, for example, the virtual workshops of the *ENGINY-era* project, which were offered in July 2020, free of charge, for the sons and daughters of members, and which allowed children to enjoy doing STEM experiments at home and through gamification. These workshops were so successful that the College offered new ones for the Christmas holidays, and a new summer edition is already being planned for July this year.

And, apart from acting at the primary and secondary level, STEM learning can also be initiated at the infant stage. Many pre-school classrooms have a corner for playing shops or hairdressing, for example, but why not also a science, technology or engineering corner?

Another problem that also needs a solution is that there is often too much influence of gender stereotypes at this stage: the lack of STEM talent

among women is alarming. It results in 17% of girls attending vocational training and less than 34% obtaining a university degree.

And specifically, within the STEM disciplines, there are, for example, degrees in mechanical, electrical or computer engineering, where the presence of women is scarce, less than 10%, according to data provided by the Escola Politècnica Superior de la Universitat de Girona.

Therefore, it is crucial that when STEM learning is promoted, it is done through coeducation and from the first stage of the school. Naturally, learning is done through experimentation and vocations are awakened, breaking with these conditioning factors. Some practices in this sense are, for example, the talks *Let's talk about Engineering* offered by the College through female engineers, and the presence of at least 50% of women in *ENGINY-era* activities.

To get more female STEM talent, efforts need to be made through policies that break glass ceilings in companies and promote equal opportunities.

We must go from estimating the few STEM women in vocational schools, universities or companies to making them count. We must break away from having only 7.5% of female role models in textbooks. Instead, we need living, accurate female role models teaching STEM and women leading the STEM business world. And so girls will be empowered because, from a very young age, they had confidence in their abilities and grow up believing that they are equal to

boys and should not be narrowed for stereotypical reasons.

On the other hand, it is also essential to prepare children and adolescents for a professional world beyond knowledge. They need to learn to speak and write about their ideas, develop their communication and emotional skills, manage time, and work in teams to find solutions to real problems.

In conclusion, STEM must be taught throughout the school stage in a practical, attractive and multidisciplinary way, through trained professionals of both genders, to have people, men and women, capable of adapting to a technological, complex and full of uncertainties in the future world.

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