

School of computational thinking and AI for teachers

POLICY DEVELOPMENT

PRACTICAL MEASURE/INITIATIVE

 SPAIN

Timeline

2018 Implementation 2019 Implementation 2020 Implementation
2021 Implementation 2022 Completed

ID number 28200

Background

Computational thinking (CT) and artificial intelligence (AI) are quickly entering different spheres of everyday life, which is also perceived in the gradual introduction in the official educational curricula of abilities related to this field knowledge. This situation raises a need to train and help students acquire these abilities and teachers to gain expertise in the development and implementation of teaching and learning scenarios that deal with CT and IA, along with the need to find evidence of the impact on the students learning continuum.

Objectives

To offer open educational resources, training and technological solutions to help Spanish teachers incorporate this skill into their teaching practice through programming and robotics activities.

Description

The School of Computational Thinking was set up in the academic year 2018/19 to train teachers to develop programming and robotics in their classrooms. This initiative is coordinated by the National Institute for Education Technologies and Teacher Training (INTEF) in collaboration with the Autonomous Communities, which provide their own teachers for the project, as the education ministry does not have the competence for the teacher training in the regions.

In primary education, teachers use computer programming using Scratch 3.0 as a resource to learn mathematics. Arduino (open-source electronic prototyping platform enabling users to create interactive electronic objects) and working with cooperative learning structures let lower secondary education students enjoy creative technology classes.

Upper secondary (*Bachillerato*) and VET students begin practising Python language, mechanics and electronics contents using a simulator that enable them to programme devices such as drones, autonomous Formula 1 cars or robots. The website CodeIntef offers additional resources and information.

2018 Implementation

2019 Implementation

During the 2019/20 academic year, the school of computational thinking included the use of artificial intelligence (AI) as an integral element of the activities of this project, which is developed in three phases: online teacher training, implementation in the classroom and research on student learning outcomes. The project has been structured on three levels according to educational stages:

Level I: Infant and Primary (1st, 2nd and 3rd years). The representation and understanding of different concepts related to AI, such as algorithms or data representation, are worked through 'unplugged' activities, in which logic games, objects and physical movements are used.

Level II: Primary (4th, 5th and 6th) and lower secondary (1st and 2nd). The objective is that students, through the creation of software products, such as video games in which they must integrate AI solutions related to machine learning, learn to recognize the way in which the computer systems they use on a daily basis use it. It is also intended to stimulate reflection on the impact of AI and its consequences.

Level III: lower secondary (3rd and 4th), upper secondary and IVET. Students are expected to achieve the same goals set for Level II through the development of applications for mobile devices.

2020 Implementation

Due to the COVID-19 pandemic, the project had to be cancelled in April 2020 and relaunched in September 2020 with the same topics - unplugged activities, scratch and app inventor. With the participation of 884 teachers, which includes 55 VET teachers, the distribution in levels is 281 participants in unplugged activities, 291 participants in Scratch 3.0, and 312 participants of the App Inventor activities.

2021 Implementation

The project was relaunched in 2020/21 with the same structure. More than 800 teachers participated in more than 350 implementation projects. The outcomes of the first edition projects are expected to be published during the first half of 2022.

2022 Completed

The School of Computational Thinking and Artificial Intelligence (EPCIA - *Escuela de Pensamiento Computacional e Inteligencia Artificial*) is included in the Plan for the Digitalisation and Digital Competences of the Education System (#DigEdu Plan), specifically in line 4 Advanced digital methodologies and competences. It is also part of the NIP actions for Spain, as the plan for the digitalisation and digital competences of the education system is one of the actions included in Spain's NIP. The outcomes of the first edition projects were published: 'The School of Computational Thinking and Artificial Intelligence 20/21: Approaches and proposals to implement in the classroom. Research results'.

The 2021-2022 edition of the EPCIA aimed to explore the possibility of offering participating teachers a wide modular training offer grouped into five areas: unplugged computational thinking; programming with blocks; programming languages (Python); artificial intelligence; robotics.

These areas address different skills and abilities that are integrated into advanced digital skills and were offered to participants in such a way that they could build their own personalised learning path by taking into account their interests and prior knowledge. Specifically, each participant completed four training modules from among those offered in each of the five areas, plus a common module for the creation of a didactic proposal, organised as follows:

- three modules chosen from among the specific general offer;
- one module for the analysis of didactic activities of the chosen area;
- one module to design a particular didactic proposal to be implemented with students.

As in previous editions, after the training process, the didactic proposal was implemented with students in the classroom, and the project's impact was evaluated through research. The results of the impact research were published.

No further editions of the projects were expected to be launched after 2022. The Code Intef website offers activities related to robotics, programming, and artificial intelligence. This web page compiles educational activities connected to these fields of technology, such as the project Código Escuela 4.0 or a section dedicated to Artificial Intelligence, and provides educational resources for students to implement.

Bodies responsible

- Ministry of Education, Vocational Training and Sports
- Ministry of Education and Vocational Training (until 2023)
- National Institute of Qualifications (INCUAL)
- Autonomous Communities (CC.AA.)

Target group

Education professionals

Teachers
Trainers
School leaders
Adult educators

Thematic categories

Modernising VET offer and delivery

Developing and updating learning resources and materials
Acquiring key competences

Teachers, trainers and school leaders competences

Systematic approaches to and opportunities for initial and continuous professional development of school leaders, teachers and trainers
Supporting teachers and trainers for and through digital

European priorities in VET

VET Recommendation

VET as an attractive choice based on modern and digitalised provision of training and skills

Osnabrück Declaration

Establishing a new lifelong learning culture - relevance of continuing VET and digitalisation

Subsystem

IVET

Further reading

[INTEF. School of Computational Thinking](#)

[INTEF. CodeIntef](#)

[ARDUINO](#)

[Almost 900 teachers and 17 000 students participate in the third edition of the School of Computational Thinking and Artificial Intelligence](#)

[INTEF. Research. The School of Computational Thinking and Impact on Learning](#)

[INTEF.The School of Computational Thinking and Artificial Intelligence 20/21: Approaches and proposals to implement in the classroom. Research results \[Escuela de Pensamiento Computacional e Inteligencia Artificial 20/21: Enfoques y propuestas para su apl](#)

[INTEF. School of Computational Thinking and Artificial Intelligence 21/22: From teacher training to methodological change. Research results. \[Escuela de Pensamiento Computacional e Inteligencia Artificial 21/22: De la formacion docente al cambio metodo](#)

[Organic Act 3/2022, of 31 March, on the organisation and integration of Vocational Training](#)


[Royal Decree 659/2023, of July 18, which develops the organisation of the Vocational Training System](#)

Related policy developments

2025 Implementation

Teacher training through digital environment

The National Institute of Education Technologies and Teacher Training (INTEF) is also responsible for the integration of ICT in non-university education.

 SPAIN

Type of development

Practical
measure/Initiative

Subsystem

IVET

2025 Implementation

Digital competence framework for teachers

The Ministry of Education and Vocational Training, through the National Institute of Educational Technologies and Teacher Training and the Autonomous Communities,

elaborated, in 2021, a new reference framework for digital competence in teaching through a commission dependent on the Working Group

 SPAIN

Type of development

Practical
measure/Initiative

Subsystem

IVET

2025 Implementation

Raising employability for ICT and the digital economy

There are multiple initiatives to raise the skills of young people and workers (employed or unemployed) in ICT and the digital economy. Different public bodies are involved, in some cases in partnership with industry.

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Type of development

Practical
measure/Initiative

Subsystem

IVET CVET

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