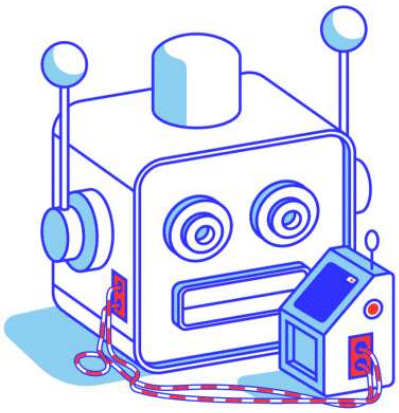
CTApp: an App to educate in problem solving while having fun

Computational Thinking, Serious Games, Internet of Things: expressions that are no longer just for professionals, like those who have made information technology their profession. Both *Computational Thinking* and *Serious Games* are in fact approached by everyone, not only because they are applied directly in computers, communication networks, systems and software applications, but because they are conceptual tools for dealing with many types of problems in many disciplines. A fundamental skill that everyone should have, especially those young people who want not to miss the opportunities that the future will present them, now and even more in the coming years. Prophetic were the words of the former President of the United States, Barack Obama, who, during the 2013 edition of *Computer Science Education Week*, addressed young people saying: "**Don't buy a new video game: create one. Don't download the latest app: design it. Don't just use your mobile: program it** ". An excellent summary of the urgency of using computational thinking and Serious Games as intellectual tools useful to everyone, whatever their job.

In an age in which the large amount of information leads users to be easily distracted, the training courses carried out by companies, organizations or institutions respond to a main need, which is to make training as effective, fast and engaging as possible. With this in mind, the trend has spread to enrich training with **videos, cartoons, online games and role-playing games**. All these multimedia contents are used by users of all ages to learn and update themselves in a playful and fun context. Thus, both Millennials and Generation Z, video game enthusiasts, and older adults can have fun and learn by playing. After all, **learning by playing** has always been one of the most ingrained mechanisms of people. Being an interactive type of learning, Serious Games allow the player to learn by doing and **create their own content**. Since the **Serious Games** have the fundamental purpose of developing skills and competences to be applied in the real world through exercise in a simulated and protected environment, they can become **very useful methods at school and in learning**, especially after the experience made during the quarantine period caused by the **Covid-19 emergency**, with **digital education** having taken on a **fundamental role** in guaranteeing the right to study of pupils.



It is with this in mind that the project co-funded by the ERASMUS + Program of the European Union **CTApp (Computational Thinnking App - *Teaching Students Computational Thinking Through a Mobile Application* - *2020 - 2023*)** (www.ctapp.eu) was born. The aim of the project is **to spread the learning of Computational Thinking Skills**. At the moment, a preliminary analysis of the state of the art has been carried out (including a questionnaire on Serious Games and Computational Thinking aimed above all at high school students - 3rd and 4th grade), in the **different Countries belonging to the Project** (Poland, Cyprus, Greece, UK and Italy) which provided valuable information for the design, implementation and evaluation of a Serious Game for mobile devices. Once the software development is finished, a large-scale trial will be carried out in which at least 200 students will be involved and their learning success with the game made will be observed. Following this test, the game will be implemented and finalized, ready

to be available on a European scale, as well as the set of training courses and materials for teachers on the use of the game (for example: manuals and educational videos).

If the European Commission has issued the *Digital Education Action Plan* (Brussels, 2018), with which it has established some priorities in the field of developing the digital skills of students and European citizens, **Italy** has dedicated an entire paragraph of the document ***National and new scenarios***, February 2018, to Computational Thinking: "**Language and mathematics**, correlated, **are the basis of computational thinking** […]. Basically, it is an **education in logical and analytical thinking aimed at solving problems**. Using it in educational play contexts (eg robotics), it unfolds its potential to the fullest, because the student immediately notices its multiple and concrete applications. This contributes to the construction of mathematical, scientific and technological skills, but also t**o the spirit of initiative, as well as to the refinement of language skills.** In today's contexts, where information technology is so pervasive, **mastering coding and computational thinking can help people govern machines and better understand how they work, without being uncritically dominated and enslaved**.".

Computational Thinking does not need technology, it comes before technology: it is a transversal skill, a problem solving process useful in any context. For this reason it deserves to be cultivated and applied in an interdisciplinary way because it constitutes a sort of fertilizer that prepares the ground both for the conscious use of technology and for the understanding of the logical aspects and the deep structure of the activities that take place. The ability to program will increasingly make the difference between those who give orders to the machines and those who carry out the orders of the machines and will allow the concepts of computational thinking to be made concrete, helping to make it in turn become a learning tool, thus correcting bad settings. of the traditional school where the student is the subject of educational systems that often make him a little participatory subject. Learning to program will allow students to get out of the logic of being mere users, being able to become potential developers themselves: **CTApp has the ambitious goal of wanting to be one of the tools capable of contributing to the training of the next generations, to make them more and more aware of their incredible creative potential**.

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