

cMinds: Teaching Programming towards the Development of Early Analytical Structural and Critical Minds

Why cMinds?



Analytical and critical thinking are transversal learning skills that help an individual excel in wide areas, professional, social, civic, and personal. They offer benefits in wide subjects ranging from science and technology to humanities and art.

Despite the applicability of analytical thinking through out an individuals' lifetime, development of the skill in early life in the context of school curricula in primary schools is not representative of its importance. cMinds aims at bridging such a gap providing children with the opportunity to engage in a process of analytical thinking through meaningful tasks and the creative use of ICT tools.

Our Goals

- To develop age appropriate inquiry and project– based didactical methodologies promoting analytical thinking and the development of creative thinkers in wider inclusive, collaborative educational environment.
- To develop proof of concept learning activities on the deployment of programming as an educational tool that motivates analytical thinking.
- To build a collaborative school network through which children and teachers can share ideas, findings and good practice recommendations.
- To validate methodologies and learning activities through their deployment in real life educational settings
- To reach a wide range of stakeholders and to promote the inte-



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Pilot Educational Applications

Programming Concepts Pilot Learning Applications

- Demonstrates **basic programming concepts** useful in analytical thinking: conditionals, loops, decisions, actions, and more
- The demonstration draws upon **real life experiences**.: 4 seasons demonstrating loops, water flow demonstrating case, commuting in the city demonstrating flow charts



Problem Deconstruction, Modeling, and Reconstruction

- Demonstrates well accepted **analytical thinking frameworks**
- Helps learners **visualize** a fully analyzed **problem**.
- Engages in an analytical thinking processes by helping learners:
 - Identify the current condition
 - Identify goals
 - Identify existing resources
 - Map alternative implementation routes
 - Identify prerequisite resources needed for implementing each solution
 - Select the desired imple-



Methods and Pedagogy



cMinds is innovative in not only on bringing to the foreground analytical thinking skills learning activities early in life, but in introducing specific, innovative didactical approaches that complement related existing school curricula

and increase children's motivation. Visual programming is seen as a tool for developing an analytical mind through its structural and precise nature. Inquiry and project-based learning activities use graphical on-line challenging applications that build on a child's curiosity. Given the international nature of the project, mostly graphical user interfaces are deployed to overcome language barriers. Educational activities are designed as a series of simple to follow steps that children are able to complete with relative independence building critical thinking, reflecting upon programming concepts and developing perceptions on selected challenging problems.

Partners

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 HiST Contract Research, Norway
 Centre for Flexible Learning, Sweden
 1st Elementary School of Volos, Greece
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