

PhD Thesis Project Offer

(valid during the calendar year 2025)

Provisional Title of the Doctoral Thesis

Educational tools for the development of computational thinking through block-based programming languages

Subject area* / Research line

Engineering and y Architecture / Doctorate Program on Information and Communication Technologies / Human-Computer Interaction and Computing in Education

Summary of the Doctoral Thesis (maximum 300 words)

There is a universal trend toward introducing informatics, and specifically programming, into pre-university education. The programming languages most commonly used for an introduction to programming are block-based languages, such as ScratchJr, Scratch, or App Inventor. However, there are several significant obstacles to this endeavor, including the lack of minimally adequate programming training for pre-university teachers.

This thesis proposal is part of efforts to improve pre-university teacher training in block-based programming. Drawing on the knowledge generated in recent decades by research in programming methodology and tools, in education, and in programming education, several innovative tools for learning this programming paradigm are proposed. During the thesis, the tools, as well as the block-based language they will target, will be determined and developed. Initially, applications with a more technical orientation (such as a tracker/debugger) or a more educational orientation (such as a question generator based on student's code) are considered. Methodological issues, such as debugging strategies for block-based programs, may also be considered.

The developed tools will be used and evaluated by pre- or in- service teachers enrolled in the university.

Is the development of this thesis associated with the execution of any research project? If so, provide details of the project (title, funding entity, and execution period)

Research grant "PROGRAMA – Novel interactive approaches based on collaborative and visualization systems aimed at learning block-based programming", Ministry of Science and Innovation, September 2023 – August 2026 (extendable for one year)

Academic Profile of the Student (maximum 200 words)

Graduate in Computer Science, Software Engineering, Video Game Design and Development, or a related degree in Engineering or Science.

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*See the Subject Areas at <https://www.urjc.es/informacion-practica#oferta-proyectos-de-tesis>.
Each project will be included in a single subject area.