

**Ph.D. in Information Technology
Thesis Defense**

October 12th, 2022

at 14:00

Aula Rossa, Bldg. n. 8, first floor

Donya ROOEIN – XXXIV Cycle

A SCALABLE, RECONFIGURABLE, AND ADAPTIVE FRAMEWORK FOR CHATBOTS IN EDUCATION

Supervisor: Prof. **Barbara Pernici**

Abstract:

Managing learning content with chatbot technology poses unique and challenging problems. Different actors are involved in the educational setting, and chatbot technology is usually created and developed by technology providers and delivered to educational institutions. The lack of provided controls in the designed technology represents limitations for using the technology on a large scale.

This is interdisciplinary research that, as a whole, investigates the design and development of educational chatbot technology, focusing on empowering non-technical actors. For this work, I focus on a configurable-driven approach including fully modular chatbot architecture techniques to face a set of identified requirements: 1) the management of learning content within the chatbot technology, 2) the strong separation between content and conversation design, 3) extensive customization for the content and conversation delivery, and 4) the empowerment of non-technical actors in education to be direct actors in the chatbot production process and maintenance. These requirements are faced through a set of case studies on different educational contents with continuous validation of the chatbot's development through large-scale experiments with teachers and students at various educational levels.

A new design of chatbots to separate content and conversation is investigated in the context of educational chatbots for tutoring tasks. To this end, I develop a scalable, configurable, and adaptive framework for building chatbots and analyzing content and conversation for the adaptive learning process. I investigate the problem of creating and maintaining chatbots in the properties of non-technical actors to empower their roles. I propose a new design of modular architecture with a configurable-driven methodology to bring more controls to the high-level actors and reduce the effort of IT support in the education domain. This thesis presents the design and implementation details of a framework to support the development of educational chatbots through the continuous validation of different use cases, with the discussion of the architecture and the development of three prototype contents. Finally, chatbot-mediated learning is explored with experiments by teachers and students from different education levels and compared to traditional learning.

PhD Committee

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