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Preface

Educators Symposium

Training in model-driven engineering (MDE) has become an integral part of universities, in addition to industrial settings, to teach MDE to practitioners. This is mainly due to the well-acknowledged importance of modeling that helps people manage the complexity of dealing with complex software systems while at the same time promoting the automation of various activities such as code and test generation. There is a consensus among modeling educators that modeling skills must be taught to students with novel methods and approaches. Current challenges in teaching modeling focus on getting students more engaged in modeling, integrating modeling across the curriculum, tool support for teaching modeling and evaluating models, and teaching model-driven engineering and model management, among others. This calls for a forum to facilitate discussion among educators on various methods, approaches, issues, and future research directions to improve teaching MDE. To this end, the Educators Symposium at MODELS 2023 is such a forum.

The 19th edition of the Educators Symposium, held as a track at the MODELS 2023 Conference in Västerås, addresses some of the challenges previously mentioned. This year, we received in total eight submissions to the symposium. Three independent reviewers reviewed each paper. In several cases, there was discussion among the reviewers to decide on the paper. After discussion, we accepted four full papers and three short papers. The symposium program also included two excellent and inspiring keynote talks to discuss current challenges in teaching MDE. The first talk, "*The Joy of Programming and How to Overcome It through Education*", was given by Bran Selic from Malina Software Corporation (Canada), while the second, "*Why Teaching Modeling in 2023 is More Important than Ever?*", was given by Andrzej Wąsowski from IT University of Copenhagen, Denmark. In the following paragraphs, we introduce the papers presented in the symposium.

The paper by Strüber entitled "*The Complexity Paradox: An Analysis of Modeling Education through the Lens of Complexity Science*" argues for the need to augment modeling education with the complexity-based thinking lens. The argument is that this approach will be more realistic, getting rid of linearism and reductionism so prevalent in Computer Science education, that diminishes the value of modeling in the students' eyes. The paper also surveys problems with teaching modeling and shows how ideas from other domains, such as the complexity lens, can apply to solve them.

Two of the papers addressed the challenge of integrating modeling across the curriculum by proposing specific courses. The first paper by Khandoker, Sint, Wimmer and Zeman entitled "*An Interdisciplinary Course on Model-Based Systems Engineering*" introduces the needs, design considerations, and in-practice application of a course in model-based systems engineering. The course is interdisciplinary, covering mechatronics, mechanical engineering, and informatics/software engineering student backgrounds. The authors have provided a detailed description that will serve as the basis for any diploma that wishes to incorporate this aspect of engineering into their curriculum.

The second paper by Vemuri, Poelmans, Compagnucci and Snoeck entitled "*Using Formative Assessment and Feedback to Train Novice Modelers in Business Process Modeling*" describes an approach used to train novice modelers by providing them feedback based on formative assessments in the area of business process modeling (BPM). The approach targets students in a post-bachelor's degree. It uses a blended learning modality and focuses on providing students with meaningful errors in their BPM diagrams. The course structure is presented, and details of the exercises used in the formative

assessments are presented. The authors evaluated their approach by analyzing the BPM diagrams submitted for eight exercises and creating a typology of common errors identified.

The paper by Morales, Planas, Clarisó and Gogolla entitled "*Generative AI in Model-Driven Software Engineering Education: Friend or Foe?*" presents a timely discussion about generative AI tools in MDE education. The authors discuss the pros and cons of generative AI in the context of teaching MDE, from the literature. It also includes an example of a correct and an incorrect prompt for learning UML.

The paper by Sağlam, Schmid, Hahner and Burger entitled "*How Students Plagiarize Modeling Assignments*" explores how plagiarism is used by students in modeling assignments. Students were asked to intentionally plagiarize models and the authors then observed/counted the methods used by the students. Additionally, an automated detection tool called Jplag was used to identify instances of plagiarism. The study revealed commendable performance from both human and automated detectors. However, scalability becomes a concern when dealing with a large number of models requiring manual comparison. Furthermore, it was observed that plagiarism-to-source models are more easily detectable automatically than plagiarism-to-plagiarism pairs.

Finally, two of the papers propose educational platforms to teach MDE. The first paper by Barnett, Zschaler, Boronat, Garcia-Dominguez and Kolovos entitled "*An Online Education Platform for Teaching MDE*" proposes a web-based tool to access a variety of MDE tools and services that can be used in an educational setting. This platform aims to simplify the installation, configuration and integration of MDE tools in order to help students focus on MDE competencies. The tool is an extension of Epsilon Playground. Students can use the platform to complete activities prepared and set up by teachers or export it for another modeling tool, while tool providers can integrate their existing tools. The usefulness of the proposed platform is illustrated using the Eclipse OCL example of library and book.

The second paper by Bucchiarone, Vazquez-Ingelmo, Schiavo, Barandoni, Garcıa-Holgado, Garcıa-Penalvo, Mosser, Pierantonio, Zschaler and Barnett entitled "*Towards Personalized Learning Paths to Empower Competency Development in Model Driven Engineering through the ENCORE Platform*" proposes a platform to support the design of personalized courses. The design of the course is based on the competencies to be achieved and takes advantage of existing open educational resources. An example course teaching MDE concepts is presented, illustrating the use of different personalized paths depending on the level of proficiency achieved by the student.

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Finally, we would like to thank all the authors who submitted their work to the symposium and the attendees of the sessions.

Enjoy the Educators Symposium!

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Educators Symposium Chairs