How to Teach Requirements Engineering: An Investigation of the Current State of the Art

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Abstract: In this talk, we report on our findings from the paper A systematic literature review of requirements engineering education [Da23b], which has been published in the Requirements Engineering Journal.

Keywords: Requirements Engineering; Education; Literature Review

1 Introduction

In this paper, we present the results of a systematic literature review on requirements engineering education. In total, we identified 152 primary studies published between 1988 and 2020 that discuss teaching approaches, challenges, and learning outcomes in requirements engineering education.

We derived three major contributions from these studies: First, we provide a systematic map of the current state of requirements engineering education research. Second, we review the current practices and educational approaches to achieve learning outcomes, thereby highlighting the differences in teaching approaches for requirements engineering topics compared to other computer science subjects. Third, we show how requirements engineering education has changed in the last decade and which topics remain unexplored in the literature.

2 Current Trends in Requirements Engineering Education

There are some clear trends recognizable that point out what is important in requirements engineering education and is reflected in current teaching approaches.

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First, preparing students for industry readiness is of vital importance in requirements engineering education [TD19]. This is shown as about 40% of studies involve industry-realistic projects, real or realistically role-played stakeholders, or problem-based paradigms to foster students’ knowledge discovery. Important aspects are seen in understanding industry and its problems, as well as developing pragmatism to finding fitting solutions in a complex set of possible approaches [Da17].

Second, requirements engineering education approaches typically focus on specific RE activities. Most prominently, elicitation (40% of studies), modeling (29%), and validation & verification (15%). This is in line with the first finding, as these activities are of particular importance to understand industry problems or contribute to industry needs. Thus, the chosen instructional approaches are very dependent on the activity in focus of the teaching intervention [DGT21].

Third, student factors and soft skills are of vital importance for teaching requirements engineering. Most prominently mentioned are teamwork, collaboration, and social interaction, accounting for more than ca. 30% of all studies. We anticipate this to increase with requirements engineering and software engineering education becoming more and more important for non computer science degrees [Da23a].

Finally, we showed that a gap still exists in requirements engineering education for cybersecurity and safety-critical systems, with only three out of 152 identified primary studies specifically accounting for these topics. Other shortcoming topics include traceability and formal approaches.

References

[Da17] Daun, Marian; Brings, Jennifer; Obe, Patricia Aluko; Pohl, Klaus; Moser, Steffen; Schumacher, Hermann; Rieß, Marcel: Teaching conceptual modeling in online courses: Coping with the need for individual feedback to modeling exercises. In: 2017 IEEE 30th Conference on Software Engineering Education and Training (CSEE&T). IEEE, pp. 134–143, 2017.


