VIEWS OF RESEARCH QUALITY IN EMPIRICAL SOFTWARE ENGINEERING

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Abstract

Background. Software Engineering (SE) research, like other applied disciplines, intends to provide trustful evidence to practice. To ensure trustful evidence, a rigorous research process based on sound research methodologies is required. Further, to be practically relevant, researchers rely on identifying original research problems that are of interest to industry; and the research must fulfill various quality standards that form the basis for the evaluation of the empirical research in SE. A dialogue and shared view of quality standards for research practice is still to be achieved within the research community.

Objectives. The main objective of this thesis is to foster dialogue and capture different views of SE researchers on method level (e.g., through the identification and reasoning on the importance of quality characteristics for experiments, surveys and case studies) as well as general quality standards for Empirical Software Engineering (ESE). Given the views of research quality, a second objective is to understand how to operationalize, i.e. build and validate instruments to assess research quality.

Method. The thesis makes use of a mixed method approach of both qualitative and quantitative nature. The research methods used were case studies, surveys, and focus groups. A range of data collection methods has been employed, such as literature review, questionnaires, and semi-structured workshops. To analyze the data, we utilized content and thematic analysis, descriptive and inferential statistics.

Results. We draw two distinct views of research quality. Through a top-down approach, we assessed and evolved a conceptual model of research quality within the ESE research community. Through a bottom-up approach, we built a checklist instrument for assessing survey-based research grounded on supporting literature and evaluated ours and others’ checklists in research practice and research education contexts.

Conclusion. The quality standards we identified and operationalized support and extend the current understanding of research quality for SE research. This is a preliminary, but still vital, step towards a shared understanding and view of research quality for ESE research. Further steps are needed to gain a shared understanding of research quality within the community.

Keywords: Research Quality, Quality Standards, Empirical Software Engineering, Research Methodology