

SIGCSE Special Project Grant Completion Report

Project: How do we teach debugging?

Andrew Luxton-Reilly (a.luxton-reilly@auckland.ac.nz), Ewan Tempero (e.tempero@auckland.ac.nz)

Dates: Awarded December 2017, completed December 2018

Abstract:

This project aimed to collate and evaluate the resources available to teach novice programmers how to debug. This included a rigorous search for online resources that explicitly teach debugging strategies, and conducting a systematic literature review of the research literature on teaching of debugging to novices. We aimed to answer the questions:

RQ1: To what extent is debugging taught in textbooks?

RQ2: What online resources are available for novice programmers to learn debugging?

RQ3: What research has been conducted on the teaching of debugging to novices.

Proposed outputs:

1. A curated online repository of links to debugging resource material.
2. A research paper that reports the results of a systematic review of debugging research literature, related to diagnosing and resolving errors.

Achieved outputs:

1. We identified 98 resources. The repository is still being refined, but is currently available at: <https://celt.blogs.auckland.ac.nz/debugging-resources/>
2. The outputs of the systematic review are in draft form and intend to be submitted for publication upon revision.

Details:

The entire grant funding was paid to a student researcher who worked on the project. We prioritized the identification of online resources to teach programming as it would likely have the greatest value. Many online resources are in the form of videos since debugging is a process that is hard to describe in static text. It was very time consuming to locate and select relevant material. Due to time constraints, the goal to examine textbooks was not completed. The student has since left the university to pursue a career as a software developer.

We are currently revising our undergraduate curriculum and intend to add more debugging. We will use our repository to inform decisions on this, and will refine and update the repository as part of this process. We also have two additional projects that aim to improve our understanding of how students engage in debugging activities and how they can be taught debugging more effectively. These projects will also use the repository. Finally, as noted on the repository website we invite the community to add to the repository.

Thanks:

We would like to thank the SIGCSE board for the opportunity to engage in this area, which we believe is worthwhile. The funding source is acknowledged in the draft paper.