Low-cost Adaptation of LEGO Serious Play to Teach Software Engineering

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Many thanks to SIGCSE for granting this award to a somewhat unusual proposal. This project not only accomplished its stated goals, but also served as a springboard to a much larger initiative, as described below.

This award enabled us to conduct a number of activities, both planned and unplanned at the time when the proposal was written.

- Low-cost case studies. A number of active learning case studies involving LEGO Serious Play have been adapted to use low-cost LEGO sets. These case studies previously required purchasing a $35 LEGO set, while the adapted versions worked well with a $5 set, resulting in $30 savings per student. These Software Engineering case studies included:
  - Requirements engineering,
  - Software architecture,
  - Software design patterns,
  - Socio-technical systems, and
  - Software dependability.
- Piloting in the classroom. These case studies were piloted in three different courses, which enabled us to collect more qualitative and quantitative data and refine each case study.
- Dissemination. A workshop presenting our work was offered to a group of 22 computer science and software engineering educators from high schools, community colleges, and universities at SIGCSE-2016. Feedback from this group provided additional input for refining our active learning case studies with LEGO.

As a result of this work, we were able to gather enough experience with using LEGO to teach Software Engineering to start looking at a bigger picture. This resulted in an NSF DUE award # 1611905 titled "LEGO-Based Active Learning Activities for Software Engineering Education." This project is still ongoing, but it has already produced a number of learning modules aimed to teach different aspects of software engineering and software development. The project website is located at http://web.ccsu.edu/lego-se/. Each of these learning modules can be adopted independently from one another in a range of computer science courses ranging from introductory programming to computer security.

This SIGCSE special project award made a significant difference in moving this larger project forward.