Robertson, J. (2010). Microworlds to Improve Learning in Introductory Programming Courses (Doctoral dissertation, Towson University, 2010).

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Dissertation Abstract

Novice programmers often struggle when attempting to learn how to write code while reducing the number of programming errors. This study investigates tools and techniques that can be used to reduce some of the obstacles many students face when learning to write a computer program. Specifically, this research aims to evaluate if entry-level programming students who use the Alice 2.0 programming environment demonstrate a better understanding of fundamental programming concepts than students who use a traditional C++ programming environment. Approximately 70 students from two face-to-face CS0 sections taught by the same instructor participated in this research. The instruments used in this research included a pre-test, demographic questionnaire, three programming assignments, a post-test, course evaluations, and final course grades. A rubric was used for the instructor to grade each programming assignment. Each assessment activity was carefully aligned with one or more course learning objectives. Results of this study showed students who used the Alice programming environment consistently scored higher in the layout (visual appeal) grading component for all programming assignments. There were no differences found between the two programming environments in regards to code functionality or design, or in the pre- and post-test scores between the two groups. A larger percentage of students from the group that used the Alice programming environment successfully passed the course. However, students in the Alice group rated the instructor and overall course significantly lower than students who used the C++ programming environment.