Using Subgoal Labeling in Teaching CS1 (now in Python!)

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Subgoal labeling is an instructional design framework for breaking down problems into pieces that are small enough for novices to grasp, and often difficult for instructors (i.e., experts) to articulate. Subgoal labels have been shown to improve student performance during problem solving in many disciplines, including computing. Improved student performance occurs because subgoal labels improve student transfer and retention of knowledge. With support from NSF (DUE-1712025, 1712231, 1927906, 2110156, 2111578), subgoal labels have been previously identified and integrated into a CS1 course (variables, expressions, conditionals, loops, arrays, classes) and an e-book has been created on the Runestone platform to enable students to complete practice problems using the subgoals. The initial implementation focused on Java, but within the past year, the development of subgoals for CS1 courses in Python have been created. Subsequently, course materials have been created as well. This workshop will introduce participants to the new materials (in Python) and demonstrate how the subgoal labels and worked examples are integrated throughout the course. Materials include worked examples and practice problems that increase in complexity and difficulty within each topic. The materials are designed to be integrated into CS1 courses as homework or classroom examples and activities. Assessment of topics using subgoal labels will also be discussed. Participants will also engage in an activity where they create an example for their own course using subgoal labels**.**

Keywords: subgoal labels; CS1; Python