

Studies on Programming Education Support with Collection and Utilization of Learning Activity Data

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The lack of information technology engineers for an advanced information society is a serious problem today. However, in universities, not a few students meet with a setback in acquisition of programming skills, a cornerstone of information technology. They may run into giving up becoming an information engineer. It is necessary to improve programming education as soon as possible.

This thesis proposes the three methods to support programming education with collection and utilization of learning activity data. The methods approach the subject from the following three points of view: (1) to maintain student motivation and make students continue learning, (2) to offer students learning guidelines and promote autonomous understanding, and (3) to reduce teacher workloads and improve quality of supervision. In addition, this thesis describes implementation of education support systems based on each method and shows results from application of the methods to actual C programming courses in the university.

The first method recommends each student appropriate programming exercises. The method infers a score of specific programming exercises for a specific student, using score histories of him and other students who addressed the same exercises in the past. The method selects an exercise to each student, based on the inferred score and the attitude toward the programming. It recommends an easy one to a student losing motivation, while a tough one to a positive student.

The second one is a method to find clues which lead students into understanding in programming training. The method grasps student personal history of learning based on source code evaluation and lecture responses. It finds clues from histories of students who have understood a specific programming technique. The method assists other students in autonomous understanding with prompting them to focus on a review of the clues.

The final method provides teachers with supporting information for supplemental supervision. The method makes personal learning records from programming exercise results. The method analyzes the records to provide supporting information for teachers. It picks out students requiring supplemental supervision. Nevertheless, it divides the students into groups depending on their learning contexts to help teachers give each group suitable supervision.