

CER Technology Fellowship Program –2008

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Project Title: A Web-Wizard to Enhance Algorithmic Problem-Solving Ability

Audience: Students in introductory programming courses.

Pedagogical Issue: Undergraduate students often struggle with introductory programming courses. Research and teaching experiences have shown that a major source of the issues students experience is related to their abilities in the pre- problem solving phase of programming, such reading skills, arithmetic and algebraic abilities, or logical thinking.

Currently, evaluation of students' problem solving skills is done through individual interaction, usually during lab hours, office hours, or review sessions. This process becomes quite difficult with large groups, and screening mechanisms for algorithmic problem solving are not available.

Solution: The development of a web-based wizard to monitor different factors of algorithmic-problem solving and to methodologically lead the user down the path of solving problems commonly seen in introductory programming.

Technologies Used: C/C++, HTML/Web Design, JavaScript, PHP, MySQL

Project Abstract: Introductory programming courses tend to present several challenges to the undergraduate student; one of which is learning the computer language and interacting with seemingly hostile programming environments, while also becoming skillful at methodologically solving problems in stepwise (algorithmic) fashion. The ability to solve problems is particularly complex because of the many factors it involves -- attention to details, dealing with abstraction, logical thinking, minimizing ambiguity, and, oftentimes, other aspects of programming affect it. Unfortunately, traditional assessment tools fail to reveal developmental issues on this matter.

Aiming to help programming students to assess, reinforce and build confidence on their own problem solving strengths, we propose the development of a web-based wizard to monitor different factors of algorithmic-problem solving and to lead the user methodically down the path of solving problems commonly seen in introductory programming. The idea behind the wizard is to track abilities fundamental to computer programming (reading comprehension, problem abstraction, arithmetic and logic skills, stepwise planning, and process analysis), skills specifically related to algorithmic-problem solving (world problem translation, world problem solution, Boolean logic, procedure comprehension, etc.), thinking styles like abstraction, attention to details, and critical thinking, as well as the confidence the user displays throughout the interaction with the tool. Besides being reported to the user and the

instructor (if used as part of a course), this information will be used in combination with an adaptive problem-solving methodology to assist the student in finding solutions to a number of problems.