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Threshold for the Introduction of Programming: Providing Learners with a Simple Computer Model

Joseph T. Khalife

Lebanese American University
PO Box 36, Byblos, Lebanon
Phone: +961-9-547254, Fax: +961-9-547256
jkhalife@lau.edu.lb

Abstract. Computer programming learning/teaching has been an active research area in computer science and engineering. The difficulty level of the teaching/learning process that novices in computer programming report is three-fold, lack of problem solving strategies, misconceptions of code syntax and semantics, and inability to develop an adequate mental model of the machine. This paper examines major difficulties encountered by students taking introductory-level programming courses and it proposes a computer model that sets thresholds for defining basic programming concepts. The study's initial findings suggest that the adoption of the model succeeded significantly in improving students' academic achievement and perception of computer programming.

Keywords. Novice Difficulties, Threshold Concept, Computer model.

1 Introduction

The learning process in introductory programming courses has captivated the interests of researchers for some time, and considerable work has been done to identify the difficulties encountered by learners. Computer scientists and practitioners have studied novice programmers' difficulties and reported extensively on what they have uncovered. Educational researchers also studied learning in general and introductory-level courses in specific, with their own set of results, of which one important finding is on threshold concepts. The present work aims to identify potential threshold concepts in introductory programming courses and propose solutions to help students surpass thresholds, with the ultimate goal of improving the learning experience for novice programmers.