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# INTEGRATION OF VISUALIZATION TECHNIQUES AND ACTIVE LEARNING STRATEGY IN LEARNING COMPUTER PROGRAMMING: A PROPOSED FRAMEWORK

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## ABSTRACT

This paper reviews the issues and problems faced by students in learning programming, thus recommend a conceptual framework to overcome the problem. Computer programming courses are said to be complex and difficult, particularly to novice students. Among the causes of students' failure in developing programming skills is their inability to visually illustrate the flow of the program code during the program execution. To overcome this problem, a Program Visualization (PV) is recognized as one of the available learning support tools that can help novice students in enhancing their understanding of the programming execution. Nevertheless, using the PV alone without the active engagement with the tools will not produce the optimal learning outcome on students' programming performance. Previous studies indicated that, active learning strategies are among the most effective strategies in learning programming. Apart from learning strategies, there is a requirement of active involvement of students in the learning process, the ability to think logically which affect their ability to solve problems, thus lead them to develop a program. In addition, using PV as learning aids is expected to increase the students' self-efficacy in learning assignment activity and overcome the challenges of learning. Consequently, it is also important that these aspects are viewed in studies related to the effectiveness of any instructional materials such as PV to enhance programming performance, particularly in finding approaches that can improve novices' self-efficacy.

**Key Words:** Programming, program visualization, active learning, logical ability, self-efficacy.