

A Survey of Software Engineering Educational Delivery Methods and Associated Learning Theories

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Abstract:

Software engineering education has acquired a notorious reputation for producing students that are ill-prepared for being productive in real-world software engineering settings. Although much attention has been devoted to improving the state of affairs in recent years, it still remains a difficult problem with no obvious solutions. In this paper, I attempt to discover some of the roots of the problem, and provide suggestions for addressing these difficulties. A survey of software engineering educational approaches is first presented. A categorization of these approaches in terms of the learning theories they leverage then reveals a number of deficiencies and potential areas for improvement. Specifically, there are a number of underutilized learning theories (Learning through Failure, Keller's ARCS, Discovery Learning, Aptitude-Treatment Interaction, Lateral Thinking, and Anchored Instruction), and the majority of existing approaches do not maximize their full educational potential. Furthermore, the approaches that engage the widest range of learning theories (practice-driven curricula, open-ended approaches, and simulation) are also the most infrequently used. Based on these observations, the following recommendations are proposed: Modify existing approaches to maximize their educational potential, design new approaches to address under-utilized learning theories, enhance the most promising approaches to make them more useful and effective, perform more formal and frequent evaluations of software engineering educational approaches, and frame software engineering education research in the context of learning theories .