Adopting Agile Concepts to Undergraduate Capstone Projects

G.A.C.A. Herath* and B. Kuhaneswaran

Department of Computing and Information Systems, Faculty of Computing, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka.

*gacaherath@gmail.com

Agile Software Development (ASD) is the most dominant software development methodology in the global software engineering industry nowadays. Accordingly, ASD has become an integral component in the curricula of computing-related degree programs. Nevertheless, teaching industry-based concepts within an academic setting is always challenging. A variety of pedagogical techniques such as lectures, capstone projects, case studies, gamification etc. are used in teaching ASD within a classroom environment. The purpose of this study is to investigate the use of capstone projects in teaching agile concepts, through a systematic literature review. The methodology is based on a standard guideline proposed by Kitchenham and Charters in 2007. Initially, a comprehensive review protocol was defined and executed. Thus, a search query was formulated and executed in 5 electronic databases to retrieve a total of 249 articles. Then the study selection criteria were applied to select 15 scholarly articles for data analysis. The findings revealed that Scrum was the most widely practised framework (60%) in capstone projects, followed by Extreme programming (13%), Kanban (13%), and Scrumban (7%). Further, several challenges faced by student agile project teams due to limitations in the academic environment were identified. These include the inability to timely communicate between team members or customers, full-time unavailability of customers and part-time students, technical skill level differences within the team, and poor knowledge of agile concepts and software estimation techniques etc. As a countermeasure, efforts have been made to modify standard agile practices to suit an academic environment, preserving their core values and principles. Mentoring or agile coaching can be identified as a successful strategy for enhancing the performance of inexperienced student teams. However, existing approaches for the assessment of the individual performance of students seem limited and ineffective. Thus, the use of capstone projects is apparently an effective pedagogical technique in teaching ASD.

Keywords: Agile Software Development, Capstone Projects, Curriculum, Systematic Literature Review