

# Chapter 14

## A Project–Based Introduction to Agile Software Development

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### ABSTRACT

*This chapter shows how a lightweight Agile process has been used to introduce Agile project development to young computer science students. This experience has been conducted on a project aimed at developing Android applications. The context, the process, and the results of this experiment are described in this chapter.*

### 1. INTRODUCTION

Agile programming is an increasingly used paradigm for the development of software. Hence, in a university curriculum of computer science, it is essential that students have the opportunity to experience the Agile paradigm. At the Louvain School of Engineering (Université catholique de Louvain, Belgium), we decided to introduce Agile software development to students through a project, during the third year of their five year

curriculum. In this project, the students had to develop their own Android application.

In this chapter, we describe this experiment and report the results. The primary objective of the experiment was to assess if an Agile software development approach was suitable for young students and if the learning outcomes could be met by means of a totally project based approach. We describe a lightweight Agile process that can be used by students to experience Agile software development as well as the various tools that have been introduced to support the development of their project. At the end of the semester, all the teams came up with a functional mobile application; 13 out of the 15 apps were of high quality

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and were distributed on the Google Play store as open-source apps.

This chapter is structured as follows. Section 2 presents the context of Louvain School of Engineering and provides a background on Agile software development. The process of this teaching experiment is described in Section 3: hypotheses (3.1), design of the process (3.2), how it has been pretested on a small set of teaching assistants (3.3), how it has been implemented for the students (3.4), and the results and evaluation of this experience (3.5). We propose directions for future research in Section 4 before the conclusion (Section 5).

## **2. BACKGROUND**

### **2.1 The Context**

The Louvain School of Engineering (Université catholique de Louvain, Belgium) introduced in 2012-2013 a one-semester project for its 300 third-year students of the Bachelor Degree. The students had to choose the project related to their major option. About 60 students picked the project in computer science for 2012-2013. The project was held in parallel with other courses and accounted for about 15% of the student workload of the semester.

A crucial pedagogical choice was made: the project should be a practical introduction to Agile software development. The objective was to let students develop their own Android application, in groups of four, using a lightweight Agile process. This lightweight process allowed us to focus on the key aspects of the Agile paradigm. Furthermore, we wanted to make the code available under an open-source license and to possibly release the applications to the Google Play Store by the end of the project. Besides technical skills, this project also aimed at developing cross-disciplinary skills such as modeling, teamwork, planning, management and communication.

Active learning, and more specifically problem-based learning (Boud & Feletti, 1998), is a long-standing practice at the Louvain School of Engineering. Active learning can be defined as anything course-related that all students in a class session are called upon to do other than simply watching, listening and taking notes (Felder & Brent, 2009). Essential elements in active learning are student activity and involvement in the learning process (Prince, 2004). It comes in multiple forms, among them: collaborative learning, where students work together in small groups towards a common goal, and problem-based learning, where relevant problems are introduced at the beginning of the instruction cycle and used to provide the context and motivation (Boud & Feletti, 1998; Johnson & Johnson, 1999; Prince, 2004). It may be noted that problem-based learning is often collaborative. The choice of an Agile software development approach fits very well with this commitment to active learning. Indeed, it promotes strong interactions and collaboration between students within a group and provides opportunity for rich interactions with the teaching team.

The challenge was also to introduce students to a new way of conducting projects. As a matter of fact, students tend to wait until the last days to work on result-focused projects (in contrast to process-focused projects). The development is thus done under extreme time constraints. As you may guess, this sometimes leads to disastrous results. The goal was to make the students realize that a lightweight Agile process can be used to plan and allocate the workload, giving significantly better results with very little overhead.

### **2.2 Agile Software Development**

Commonly called Agile, this movement groups several approaches to software development and project management. It focuses on very high collaboration within the team and strong involvement of the customer in the development process by building cross-functional and self-organized

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