

# Chapter 17

## A Project–Oriented Approach to Practicum on Software Engineering Methodology Courses

**Tatiana Nikolaevna Romanova**

*Bauman Moscow State Technical University, Russia*

**Tatiana Ivanovna Vishnevskaya**

*Bauman Moscow State Technical University, Russia*

**Dorjsuren Odselmaa**

*Mongolian University Science and Technology, Mongolia*

### ABSTRACT

*This chapter suggests a method for practicum on software engineering methodology course using a project-oriented approach. The chapter features basic organization principles of the approach and examples of methodical support for laboratory works based on these principles, and provides recommendations on choice and use of methodologies and technologies of software engineering for the development of distributed information systems. The experience of using this technique for teaching students studying for a Master's degree in Software Engineering in Bauman Moscow State Technical University is presented.*

### INTRODUCTION

Wide software application in numerous spheres of life calls for dramatically higher standards of software quality, reliability and security. Software engineering is an integral part of all the stages of the production of complex software and software-technical systems starting from the very beginning of software creation to its deployment and maintenance (Gomes, Mendes, & Marcelino, 2015). The main concepts of software engineering are formalized in a set of international standards and are studied in the Methodology of software engineering (MSE), which is a theoretical course (Lipaev, 2006). The course is taught to students studying for a master degree in Software engineering.

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The course comprises lectures and practical classes. Different universities have different approaches to practical classes. For example, students studying at the department of Software Engineering of the faculty of Computer Science of NRU HSE write a paper on a specified topic as a report on the practicum and build an application using the techniques studied in the course (Saleh, 2016). In Southern Federal University students studying for the master's degree explore existing software tools for program verification within laboratory classes. In BMSTU our target is to organize practicum in such a way, as to not only study the theory of MSE but also use it to ensure the development of quality software. Students studying for the master's degree in Software engineering are to be well versed in the fundamental principles and systematic approaches namely solving issues of development, deployment and maintenance of software systems, described in (Lattanze, 2008), and as well as in methods of their application (Bass, Clements, & Kazman, 2012).

## **METHOD**

Within their professional training master students encounter some difficulties in studying the following disciplines: Distributed systems of information processing (DSIO) and Methodology of software engineering. Thus, a new, distinct from traditional, approach of training was required. A project-oriented approach described in (Zamyatina, & Mozgaleva, 2014) was chosen as such. Implementation of the project-oriented approach features shaping master students' professional skills through completing real engineering tasks. As such, within their laboratory works on MSE, the students are tasked to perform the information systems design, which is also constitutes a part of their course paper on the DSIO discipline.

In addition, the subject area to be analyzed as well as development tools are selected for each master on the basis of his/her personal professional interests, activity areas and experience of relevant software developments. This allows the teacher to work with each master individually or in small teams of two or three students (Pressman, 2009).

The level of competence of an expert is determined by the amount of knowledge and experience gained through his/her own activities in a particular subject area. As the proposed approach to shaping professional competences of master students is based on their own professional experience and activities, such an educational approach can also be classified as a competence-oriented approach. The project-oriented approach has been further complimented by a methodological educational model, which allows to bring together the theory of the methodology of software engineering and practical experience of the master students.

The proposed method objective: To form the professional competence of master students in the process of studying the Methodology of software engineering.

To achieve this goal the following tasks are to be solved:

- To develop the skills of formalization of customer requirements;
- To develop the skills of using modern paradigms, methods and notations of software engineering for building problem domain models;
- To develop the skills of process and data structures modeling ;
- To develop the ability for team-work;

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