Chapter 7
Building Open Learning Environment for Software Engineering Students

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ABSTRACT

The chapter discusses principles of open education and possibilities of implementing these principles for software engineering education on the base of open source software development projects. A framework of practical courses for software engineering students built on these ideas is presented. Experience of building courses on the base of this framework is discussed on the example of "Software Engineering" course provided to students of the System Programming departments of the two Russian top-ranked universities, Moscow State University and Moscow Institute of Physics and Technology.

INTRODUCTION

Educational system should match the needs and tendencies of continuously developing society to sustain its evolution. That is the reason of evergrowing demand for innovation education programs, methods, and supporting infrastructure across all over the world. A conceptual base for innovation education in Russia was formed by academician M. A. Lavrentev (Computer Museum, 2006) who states a principle of "sciences—personnel — industry" (triangle of Lavrentev

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(Khristianovich, Lavrentev & Lebedev, 1956 and Dobretsov, 2001)). Most of currently applied approaches of innovation education implement this idea in modern conditions – education happens during generation of new knowledge as a result of integration of fundamental science, educational process, and industry.

Traditional system of professional education is mainly based on transition to students of fundamental knowledge helping them to feel themselves with confidence in some area and skills that can be applied in some practical work at once. However, under the conditions of intensive technological evolution, such an approach to education becomes irrelevant because students slowly become able to transform fundamental knowledge to practically applicable one as well as concrete practical knowledge quickly becomes outdated and unclaimed. The main abilities demanded in these circumstances become adaptability, constant knowledge update, decision making unbiased from established patterns, dynamic activity planning, etc.

All these issues are applicable to the area of software engineering, which evolves very quickly. Schematically, the main fields of skills and knowledge of information technology professionals can be presented as in Figure 1 (A.K. Petrenko, O.L. Petrenko & Kuliamin, 2008). So, just subject knowledge is not enough for successful work of a good specialist in the modern society. The Memorandum of European Commission on lifelong learning (2000) emphasizes the need in such social skills as acting with confidence, result-oriented focus of personal activities, right balancing of risks and responsibility in decision making, as well as such cognitive skills as ability to learn continuously, adaptability to changing environment, skills in finding right information in various areas, and ability to filter necessary information in the huge informational flow that each active individual in the modern society is subject to.

In general some specific arrangements are required to make high school graduates more compliant with labor market requirements. In some high schools teaching Information Technologies undergraduates have few possibilities to work with real-life examples in their domain, so starting their career they immediately face with the issues not covered in the traditional university courses. Such courses are usually focused on scientific and technical aspects of the domain and contain (if any) only rather shallow presentation of organizational and social issues. Potential of many undergraduates is inhibited by lack of knowledge and skills at these areas. One more

Figure 1. Main skills of modern IT-professionals