Chapter VIII

Conceiving Architectural Aspects for Quality Software Education through the Constructivist Perspective

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ABSTRACT

This chapter describes the initiative to incorporate the practice of quality software education (QSE) into our undergraduate curriculum concerning the engineering of software. We discuss how the constructivist's method of problem-based learning (PBL) helps develop this QSE practice in our students' daily learning. We also expound the idea of an architectural context to building information systems (IS) solutions, supported by the industry's emerging consensus that architecture provides the kind of thinking and methods we need to develop today's complex systems. Our QSE approach focuses on designing problems, which require the building of a sensible IS architecture characterized by objects of different services. Our QSE approach is outlined in terms of a state-of-the-practice management philosophy called action learning, modified for educational scenarios, so that our students could learn to acquire their collaborative software engineering and management experience in the practice of architected applications development. To conclude, the criteria used to evaluate the working of our learning scenario and the challenge in combining action learning with PBL in innovating different QSE experiences for our students is discussed.

INTRODUCTION

In today's knowledge economy (OECD, 1996), as the possibilities of the information revolution challenge traditional business logic, many an organization has embarked on the journey of electronic transformation (Cook, 1996; Umar, 1997). According to Hammer and Champy (1993), this is the fundamental rethinking and radical redesign of business processes to achieve dramatic organizational improvements. In the past, the order of the day was to reorganize the technology each time a business changed. Yet, the reoriented consensus was to facilitate software solutions that adapted as the business adapted. This support for an increasingly adaptive business is currently achieved through the reuse of business components (Eeles, 2000), which are executable units of code that provide physical black-box encapsulation of related business services, accessed through a consistent, published interface that includes an interaction standard with other components. These business components support a process-based view of the business as it changes. Consequently, it is important to derive the necessary business models, which are traceable back to the originating requirements, in order to provide a secure foundation to develop the component-based information systems (IS) support. Indeed, this is often the backdrop behind which most of our universities' undergraduate programs in Software Engineering and Information Systems have been running. The fact of the matter is, we are often confronted with the situation (Dawson & Newsham, 1997) that most of our graduates today begin their careers lacking an appreciation of real-world conditions (Speed, 1999; Wasserman, 1996; Shaw, 1990). As academics, the haunting question is this: How do we cultivate future graduates who become more prepared to tackle real-world problems in the engineering of software for quality IS solutions, starting from their university education? This chapter serves as an educational response to devise suitable quality software education (QSE) scenarios for our students' active learning experiences. In the following discussion, we first introduce our architectural context for IS education, then provide a briefing on our pedagogy of action learning (Dean, 1998; Dilworth, 1998b; Revans, 1998) substantiated with problem-based learning (PBL) (Albanese & Mitchell, 1993; Engel, 1991; Ryan, 1993; Barrows, 1985). Next, we present some scenarios for enterprise's electronic transformation pivoted by e-business initiatives, followed by our elaboration of some architectural topics of our QSE curriculum. Finally, we discuss our criteria in evaluating the practice of PBL as well as some lessons learned from conducting the QSE.

THE ARCHITECTURAL CONTEXT FOR IS EDUCATION

Our discussion of the architectural context for IS education is centered about several themes: first, to clarify why we need architecture to build IS solution; second, to define what constitutes architecture in the IS context; and third, to provide a high-level introduction to the architectural approach to building IS solutions.

The WHY of Architecture in IS

The key technical issue in developing an information system — be it a conventional IS or a Web IS — is why we need an architecture in IS construction. We could resort to the insight and intuition of a building architect to extrapolate to the IS world and propose a list of

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