ABSTRACT

Educational institutions worldwide are undergoing significant transformation in response to the changing economic scenario which is pressuring them to be innovative while reassessing their allotment of resources. As a result, many institutions are moving towards large-scale use of information technology (IT) to manage knowledge at different organizational levels. The authors present findings from a case study of an action research project undertaken to design and implement a web-based advising system for managing and sharing knowledge required by first-year engineering students. The primary users of the system were faculty members who advised students, as well as the students themselves. By following a participatory action research approach in combination with a socio-technical framework, the designed and implemented system – AdWiki – improved the use of existing advising resources as well as created new advising practices by integrating IT and organizational processes. In addition to socio-technical design literature their findings corroborate and extend the Socio-Technical Systems Engineering (STSE) framework. They provide evidence that ‘sensitization and awareness’ and ‘constructive engagement’, two core activities proposed in the STSE framework, can be effectively applied in practice to integrate organizational process and technological possibilities for managing knowledge. Findings from the case study also extend the socio-technical approach by incorporating components of action research into the framework and demonstrating the use of methods that allowed for virtual participation in systems development.

Keywords: Action Research, Advising Knowledge Management, Education Technology, Participatory Action Research (PAR), Socio-Technical Design, Socio-Technical Systems Engineering (STSE)
1. INTRODUCTION

In the current global economic climate, higher education institutions across the world are facing severe cross-cutting and resource constraints (Chronicle, 2012). At the same time, they are under intense pressure from global competition to improve their quality of education. In the U.S., which is the context in which this case study is situated, educational institutions face increased pressure from policy makers and government to improve undergraduate engineering education by increasing retention of students and their rates of graduation (Boyer Report, 1998; NAE, 2004; NAE, 2005). Despite efforts by educational institutions through measures such as implementation of learning communities, advising, mentoring, and pre-college programs to recruit and retain more engineering students, declines in engineering enrollments continue (NAE, 2005). To confront these challenges, U.S. higher education institutions are increasingly turning to IT-based systems to control costs and improve efficiency of service delivery and specially to manage institutional knowledge at various levels. But as educational institutions move towards this goal, they face many challenges. A core issue in successful utilization of IT for improvement of services is the integration of IT with organizational processes in a meaningful manner (Wulf & Rohde, 1995)—in other words, to achieve socio-technical integration. Within educational institutions, some IT systems such HR and financial ERP systems affect a relatively smaller user population and are easier to design and implement. Whereas others, such as online learning platforms, affect a more diverse and different user population, including faculty, staff, students, system administrators, and IT developers, and are harder to integrate within the organizational context.

We present findings from a project that was undertaken with the explicit aim to improve advising for first-year engineering students. Advising is an integral part of each student’s educational experience (Fiddler & Alicea, 1996) and in this time of restricted and plummeting university budgets there is always a danger that advising will move further down the list of activities that supporting student in their educational mission (Glennen, Farren, & Vowell, 1996). The activity is inherently about managing knowledge in a dynamic fashion as advising issues keep changing with every school year. Although our initial project charge was solution-neutral, we realized that use of IT will allow us to achieve our goals in the most satisfactory manner. Thereafter, our work was driven by a socio-technical approach to design (Fischer & Herrmann, 2011). In addition, we (the research team) were also the beneficiaries and users of the system, and therefore our approach was an action research project. The system we designed – Adwiki – was quite successful at meeting its goals and after running effectively for a year it was integrated with another system that was introduced after our organization underwent further changes. We believe that the description of our project and findings from our work are relevant and useful as they demonstrate the potential of a socio-technical design approach (Fischer & Herrmann, 2011) and corroborate and extend the Socio-Technical Systems Engineering (STSE) framework (Baxter & Sommerwille, 2011) an important and useful design, analysis, and implementation tool. Our project provides evidence that ‘sensitization and awareness’ and ‘constructive engagement’, two core activities proposed in the STSE framework, can be effectively applied in practice to integrate organizational process and technological possibilities. Our project also shows that STSE in conjunction with action research can be a powerful combination to bring out change where organizational and technical components are synergistic.

The rest of the paper is arranged as follows. We first present a contextual overview of the research setting. In the subsequent sections we ground our research theoretically within the socio-technical framework, especially STSE. We discuss our methodological approach and describe the design, implementation, and use of AdWiki. We then present a discussion section which evaluates the implications of our work – both pragmatically and theoretically – and
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