ABSTRACT

The learning and accountability needs in a teacher education department drove the development of a novel, Web-based education accountability system (EAS). To fit the EAS with the organization, actor-network theory (ANT) was used to guide the social and technological development. In the course of this fitting, a novel multi-dimensional perspective to ANT was formalized. Four dimensions of organizational culture, power/politics, process/operation and profession were used. Participant observation, field notes and interviews were used to surface negotiations during periods of controversy to reveal how standard teacher education practices were created and recreated. Detailed translations occurring at multiple levels provided insight into the technical agency of the EAS and how its inscriptions shaped the emergence of a socio-technical information systems (IS) solution for a teacher education program.

INTRODUCTION

To better understand the interplay between technology and organizations, the “black-box” of technology and process must be opened to expose the embedded socio-economic patterns (Bijker & Law, 1992). The implementation of an IS is shaped by the organizational context and
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simultaneously enables and constrains the organization (Orlikowski, 1991). Economic, political and cultural issues should be examined together with the IS as a socio-technical interaction network (Kling, Kim, & King, 2003). Common approaches to researching technological innovation in education focus on the technical aspects of an innovation. Traditional determinism frameworks can not account for the interactions between IS design and organizational changes (Law & Callon, 1988; Scacchi, 2004). IS research needs to explore the interaction between IT and its social context (Orlikowski & Iacono, 2001). ANT offers a good means to achieve this end by its impartial treatment of the contributions of both human and non-human actors.

Teacher education accreditation presents great challenges to the teacher education programs in the United States. The National Council for Accreditation of Teacher Education (NCATE) introduced new standards in 2000 (Castenell, Benson, deMarrais, Butchart, & Lewis, 2001; Linn, 2000), and teacher education programs must comply with those standards. The comprehensive data collection mandated by the NCATE 2000 standards required advanced IS solutions and organizational changes (Wise, 2001). This study extends ANT analysis with multidimensional views and property models to examine the translations that occurred during the successful implementation of a Web-based EAS. EAS helps teacher candidates to learn and the unit to comply with NCATE. The impact of Web technology on learning (e.g., Esnault & Zeiliger, 2000; Folkman & Berge, 2002) has been extended in this study to overall program improvement.

THEORETICAL FRAMEWORK

Technological determinist approaches to technology innovation contend that all outcomes of technological change are attributable to the technological rather than the social (Grint & Woolgar, 1997). At the other extreme is social determinism, which holds that social factors can be used to explain technological change (Law & Callon, 1988). Intermediate approaches (Barley, 1986; Giddens, 1984; Kling, 1987; Orlikowski, 1992) emphasize the contingent relationship between the social and technical. Seeking an approach that strikes a balance between the social and technical elements leads to ANT (Doolin & Lowe, 2002). In terms of the adoption of technology in education, ANT stands in sharp contrast to diffusion theory (Rogers, 2003). Diffusion theory in education treats technology as immutable in the transmission process in which definable factors affect the adoption (Dooley, 1999), while ANT treats technology transmission as a process of continuous transformation in which technology and social context are mutually shaped.

ANT treats human and non-human stakeholders analytically as actors who have aligned interests in a socio-technical actor-network. The actor-network seeks stabilization through the processes of translation and inscription. The interests of various actors are translated, aligned and inscribed into technical and social arrangements, such as business norms or software applications, which stabilize the actor-network, at least temporarily (Callon, 1991). Once stabilized, an actor-network may become seemingly irreversible and thus resistant to further translation (Callon, 1991). Therefore, formation and maintenance of a strong actor-network with aligned interests is crucial to the success of an IS project.

Multiple perspectives are valuable for IS development (Hirschheim & Klein, 1989). Multidimensional analysis has its root in “multiple perspectives” theory (Steinbruner, 1974; Checkland, 1981). Examples of multiperspective theory include: technology-organization-people (Linstone, 1999), Wuli-Shili-Renli (Zhu, 2000), and multimodal systems design (de Raadt, 2001). Atkinson’s multidimensional representation of actor-networks identifies four dimensions: the informational, the clinical decision-making, the psychosocial and the power/political (Atkinson,