Design principles for the Knowledge-Practices Laboratory (KP-Lab) project

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Abstract: The poster introduces the design principles for the Knowledge-Practices Laboratory (KP-Lab) project. KP-Lab is based on technological, theoretical, pedagogical, and social innovations aimed at facilitating innovative practices of working with knowledge, "knowledge practices", in education and workplaces. In order to be truly productive, collaborative technologies cannot fully be specified beforehand but need to co-evolve with social practices and be further modifiable according to the users' emerging needs and practices.

Introduction

Future challenges of European society require policy makers, educators, researchers, technology developers and teachers to devise ways to prepare learners to engage in intensive work focused on deliberate knowledge advancement (Bereiter, 2000; Hakkarainen, Palonen, Paavola, & Lehtinen, 2004). Knowledge work requires managing complex knowledge through dynamically evolving forms of collaborative teamwork and sustained knowledge sharing. Innovation and knowledge creation activities are becoming commonplace and the most important sources of new material and intellectual wealth. In terms of the educational practices, a challenge for the knowledge society is that students, teachers, professionals, designers, and researchers take part not only in knowledge acquisition or social participation processes, but also knowledge creation focusing around shared objects of activity. The *Knowledge-Practice Laboratory* (KP-Lab) project will focus on creating the KP-Lab learning system aimed at facilitating innovative practices of working with knowledge ("knowledge practices") in education and workplaces. The system is considered in a number of its real-life instantiations whose data provide feedback for its continuing refinement. KP-Lab is a five-year (2006-2010) integrated project concerning the Technology-Enhanced Learning (Information Society Technologies) program of the European Community. University of Helsinki and EVTEK University of Applied Sciences coordinate the project, involving 22 organizations from 14 European countries. The design principles shaping the KP-Lab project are as follows: Principle 1. Organizing activity around collaborative advancement of knowledge artefacts; Principle 2. "Symmetric knowledge advancement" (Scardamalia, 2002) around authentic problems; Principle 3. Deliberate transformation of knowledge practices; Principle 4. Co-evolution of tools, social practices, and agents. These design principles will be implemented throughout the project in order to generate four types of innovation.

Theoretical innovation

As a theoretical innovation, the KP-Lab represents an approach to human cognition which assists going beyond acquisition (monological, within mind approach) and participation (dialogical, interactive approach) metaphors of learning to consider also knowledge-creation processes, and related tools and practices critical for answering the challenges of the emerging innovation society. According to the knowledge-creation approach, cognition is seen to develop through collaborative work in systematically developing shared, conceptual or material artefacts, such as concepts, plans, products, or social practices (Paavola, Lipponen, & Hakkarainen, 2004, Paavola & Hakkarainen, 2005). These kinds of processes are considered to be "trialogical" in nature in terms of the participants activities mediated through jointly developed knowledge artefacts. This kind of approach has deep historical roots, but their analysis and more importantly their assessment are in the infancy stage. The KP-Lab project will develop and explicate the theoretical foundations of the knowledge-creation ("trialogical") approach. In addition it will develop and test concrete models and tools for trialogical knowledge practices in various contexts (higher education, polytechnics, working life, secondary-level education).

Pedagogical innovation

Innovative knowledge practices will be facilitated across multiple domains of knowledge by organizing a series of technology-mediated KP-Lab courses in which students solve complex problems for real customers (i.e.,

enterprises, research communities or public organizations) and pursue field training in professional communities. This pedagogy requires teachers to function more like managers of knowledge-intensive companies than simple distributors of knowledge. Student teams supported by tools of ubiquitous computing are asked to engage in either concrete or virtual knowledge-creating activities that involve breaking boundaries of their educational institutions and building novel connections with professional communities and corresponding knowledge practices. These efforts will create new student-expert partnerships as well as novel networks of polytechnics, universities, and professional communities in terms of shared efforts of advancing knowledge practices throughout Europe.

Social innovation

KP-Lab's design principles emerge from two decades of educational and socio-cognitive research concerning technology-enhanced learning. These investigations indicate that technology-enhanced learning transforms educational practices only through transformed social practices. In order to deal with this challenge, KP-Lab puts reflective social practices around shared knowledge artefacts into the core of technology-enhanced learning. Toward that end, it provides the participants tools for reflecting on, making visible, and transforming their knowledge practices. The challenge is to design technical tools and solutions that encourage the users to engage in thinking and collective reflection, so as to promote organizational intelligence and deliberate transformation of knowledge practices within the social matrix of knowledge creation. An essential aspect of KP-Lab will be to design virtual change-laboratory tools based on "change-laboratory" (Engeström, Virkkunen, Helle, Pihlaja, & Poikela, 1996) interventions that will allow participants, whether they are students, teachers, or professionals, to master, together, the challenges of the current activity and to work deliberately for innovative redesign of their collective activities. Participants of KP-Lab, whether they are students of higher education or professionals, will be engaged to jointly reflect on and make visible their knowledge practices in order to set these up as objects of deliberate change and improvement.

Technological innovation

KP-Lab will be a modular, flexible and extensible system consisting of a cluster of inter-operable applications (i.e., shared collaborative spaces, semantic web knowledge services, communication platform, ubiquitous user agents, inter-institutional access) which organize participants' collaborative activity around shared knowledge artefacts. Ubiquitous user agents provide end-users with inter-institutional access to KP-Lab services such as shared collaborative working spaces, semantic web knowledge repository, and real-time multimedia communication for individuals and groups. The KP-Lab system will be designed according to openness, modularity, and compatibility with the Semantic Web technology. The KP-Lab intends to research and develop a generic middleware supporting flexible knowledge management services for learning applications. It will be made available as an open-source software also for end-user applications beyond the present project. In order to be truly productive, collaborative technologies cannot fully be specified beforehand but need to *co-evolve* with social practices and be further modifiable according to the users' emerging needs and practical innovations. Consequently, the KP-Lab is intended to be a "laboratory" in terms of providing a testbed for developing transformative knowledge practices for educational institutions and workplaces. The project will be carried out through several stages that involve iterative technology development and empirical testing and piloting of KP-Labs technologies and practices. A special effort will be invested to identify and analyze reciprocal individual and social transformations taking place across sustained trialogical efforts of knowledge advancement undertaken in KP-Labs.

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