Socio-Technical Theory and Knowledge Construction: Towards New Pedagogical Paradigms?

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The socio-technical theory

It hypothesizes the presence of two subsystems in every organization or corporate and states that the best results are achieved by a design process aiming at the joint optimization of the social and technical subsystems.

Today a leading role is recognized to autonomous and/or semiautonomous groups within the organization (i.e., communities of practices) (Coakes, 2004).

Groups and communities of practices (CoPs) arise from special social relationships and are made by individuals, which are motivated to participation by common sets of interests and are willing to develop and share both tacit and explicit knowledge.
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Structure of the presentation

a) Analysis of some experiences with paleography students from the following viewpoints:
   - subject,
   - community,
   - society

b) Revision of the model for the socio-technical theory

c) Application of the new model to education and especially to a master course for teachers
Analysis of some experiences with paleography students

During last years, while cooperating with M. Palma (professor of Latin paleography), different web sites to be used for research and teaching were planned and carried out, “Teaching Materials for Paleography”, “Women and written culture in the Middle Ages” (Cartelli, Miglio & Palma, 2001), the “Open Catalog of Manuscripts of the Malatestiana Library” (Cartelli & Palma, 2002, 2003), the “BMB on line (Bibliography of Beneventan Manuscripts)” (Cartelli & Palma, 2004).

In almost all the sites (dynamic and interfaced with RDBMS) differently allowed people can store data in the systems (bibliographies, images, text files, messages etc.) or can only retrieve information by making queries. As an example the BMB on line is analyzed in a greater detail; we have one system administrator, one or more scientific administra-tor/s and many contributor/s managing bibliographies and communicating among themselves with forums, electronic blackboards etc.; general users can only query the system.
Knowledge construction

In all the experiences the phenomenon of knowledge construction and evolution has been analyzed from different viewpoints (Cartelli, 2006).
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The viewpoint of subjects
- Web technologies (i.e., the information systems underlying the sites), contributed in creating constructivist learning environments (Collins, Seely Brown, & Newman, 1994) and in helping students to develop cognitive apprenticeship strategies (Jonassen, 1994), which improved students’ learning and performances,
- the features of communities of learners (CoLs) and fostered communities of learners (FCL) (Brown & Campione, 1994, 1996) were detected (web technologies created communities not usually detected in those contexts),
- new skills never observed in traditional paleography courses were observed: a) talent in working in a group, b) easier facing of complex tasks (thanks to the help each student could have from colleagues) and c) raising of the individual’s peculiarities within the community. In other words the results from M. Scardamalia and C. Bereiter (1994) on the effects of virtual environments and simulations and the ones from J. Lave and E. Wenger (1991) on Legitimate Peripheral Participation (LPP) were confirmed.
The viewpoint of communities

- Information systems can make easier the construction of communities of practices and at least a CoP is built around each one of them,
- Every system implements all or part of the implicit knowledge developed from people working on manuscripts (by means of the processes it manages) and makes easier the socialization of the procedures used in the community (by forcing people to adopt the same procedures); the same system externalizes the tacit knowledge by forcing students/scholars to the use of those procedures.

What's new: the implementation of the community processes in the information system starts a SECI cycle with the introduction of a new element (no community and no cycle where detected before the introduction of the information system)
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The viewpoint of society / organization

Two different situations have been deeply observed: learning organizations and scientific knowledge.

As regards the former ones it has to be noted:

a) the model hypothesized for knowledge evolution in a CoP can be generalized and exported to corporate and organizations,
b) the implementation into information systems of the scholars’ working processes and procedures gives a new perspective to knowledge management instruments and strategies.

As regards scientific knowledge it has to be noted that:

a) the information stored in the systems is certified by the scientific committees governing the sites,
b) people querying the sites interact with the information systems and retrieve information that can be used for building new scientific knowledge (Cartelli, 2006).
The new model for the socio-technical theory
Application of the new model for socio-technical theory

The theoretical model reported above is general enough to be applied to different situations. An example can be found in the master course for teachers “Teacher and Tutor in the renewed school” (Docente e tutor nella scuola riformata), which started in academic year 2005-2006 in the University of Cassino, Italy.

The course aimed at answering to the request of in-service training coming from the school (after the many changes in everyday teaching due to the reform laws introduced in 2003) and had the following features:
- It was a blended course (with presence meeting and on-line teaching-learning activities)
- It was based on two systems:
  a) one e-learning platform to be used as a CMS and CSCLS,
  b) the TETIS (teaching transparency information system) platform implementing the new teaching processes introduced from the reform law
The TETIS platform

It aims at making transparent teaching-learning processes so that each actor of the educational activity can access his/her data and look at the evolution of his/her profile with respect to the planned activities and to the data managed from different people (teachers, students and families, social workers, researchers etc.)

Furthermore forums were available to:
- teachers in a class,
- teachers, students and families in a class,
- teachers of the same disciplines,
- etc.
Teaching-learning processes implemented in TETIS platform

The scheme on the left has been the starting point for the implementation of the changes induced from the reform laws in everyday teaching.
What’s new with pedagogical paradigms?

ICT and web technologies let us implement processes and use information systems for teaching-training people to their use. Socio-technical theory helps us in planning suitable information systems.

The new paradigm joins better known paradigms all based on ICT use, like:
- Augmented reality
- Simulation in virtual environments
- etc.