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# METHODS AND TOOLS FOR DEVELOPING PERSONAL KNOWLEDGE MANAGEMENT SKILLS IN THE CONNECTIVIST ERA

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## **Purpose**

In the connectivist era, i.e. our contemporary society, the issues of teaching and learning are deeply entwined with an other set of issues, those dealing with how we manage our personal knowledge (PKM, Personal Knowledge Management) using the new technologies of the digital age (Sorrentino et al., 2006). In this paper we provide a Reference Model to support educators in the planning and design of learning experiences precisely in that context. The Model applies to a networked environment oriented to the acquisition of specific PKM skills, those required to become a “life-long learners in the knowledge society”.

## **Learning and lifelong-learning in the connectivist era**

Informal learning is an adaptive process determined by the “need to explore” which emerges in specific experiential contexts (Calvani, 2005). People acquire their competencies in their everyday life, by talking, observing others, making attempts and making mistakes, working together with more or less expert colleagues: informal learning can therefore be understood as the natural corollary of daily life (Bonaiuti, 2006). Informal e-learning is receiving ever greater attention because of the wide spreading of social networking practices and technologies. Social networking - meaning the individual’s attitude to use available technologies and services to take part in network-based virtual communities - is emerging as a highly natural practice because it is deeply rooted in our daily behavior. Spontaneous relations, interactions and conversations support informal learning practices, contributing to the creation and transmission of knowledge. At the same time, the lifelong-learning culture is gaining importance as one of the most effective answers to face the challenges of the Information and Knowledge Society. If this Society requires individuals to continuously update their knowledge – or *e-knowledge* (Sorrentino, 2006) - this cannot happen as a progressive “knowledge accumulation” process. Instead, it can occur through the preservation of our connections (Siemens, 2006) and through the catalyzing and filtering effect of being exposed to those connections: the true competence for a lifelong learner of the Knowledge Society is the capability to “stay connected” and “belong” to digital communities where interests are and can be continuously shared.

In 2004, the scholar G. Siemens launched the theory of Connectivism based on a critique of previous main learning theories synthetically labeled as behaviorism, cognitivism and constructivism (Siemens, 2004). According to Siemens, even the latter theory, which appeared to be the possible theoretical framework for e-learning practices (more specifically in its variant named “social constructivism”) – could not provide an adequate theoretical support to the instances brought by the new learning contexts.

Innovation in technology has brought about new (or revisited) processes and practices, expressed

through new (or revisited) criteria and terms. Recently, the educational e-learning universe with all its possible variants, i.e. formal, informal, non formal, lifelong coupled with connectivism features, etc. have been named (“tagged”) *e-learning 2.0* or *learning 2.0* (Downes, 2005), analogously to what happened for the web 2.0 phenomena (O’Reilly, 2004).

Against this background we can now put forward several questions. How is learning affected when new personal knowledge management skills become embedded in our daily life? How can these skills be acquired? Which tools can shape these competences? Can we frame a theoretical model supporting the lifelong-learning objectives within the theories of connectivism, along a research path which accounts for the social aspects of knowledge and learning?

## Personal Knowledge Management in the Knowledge Society

What is PKM? Its origin is in the university environment, in the years after 1999, in two U.S. institutions, first at UCLA, Los Angeles, CA. and then at Millikin University in Decatur, IL. (Frاند & Hixon, 1999), (Millikin, 2003). Initially, and for some time, PKM has been an isolated concern of universities, but subsequently it has been re-interpreted as valuable in any environment, including the enterprise. According to Professor Paul A. Dorsey at Millikin, a leader in the field:

*Personal knowledge management is best viewed as based on a set of problem solving skills that have both a logical or conceptual as well as physical or hands-on component.* (Avery et al., 2000).

PKM is a concept with depth and complexity, but its roots are clear and simple: if knowledge is power, a precious asset to attain leadership and self-realization, why should it not be at the center of an individual’s *personal* aspirations and efforts? Why should it not be the object of specific skill development?

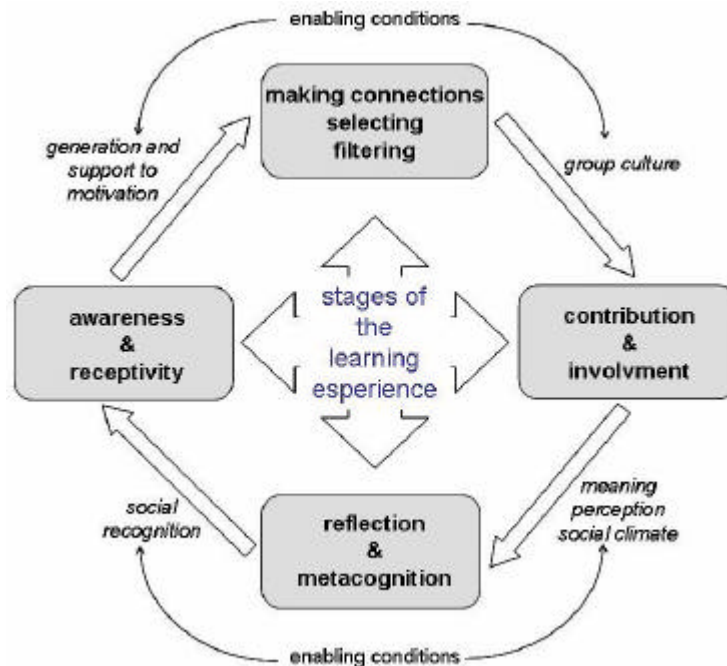
### *PKM skills and skill acquisition in the Knowledge Society*

In view of establishing the relation between PKM skills and learning design, we group PKM skills under three macro-competence categories, CREATE, ORGANIZE and SHARE, as shown in the following table:

CREATE	ORGANIZE	SHARE
<p><i>Editing</i>: exploit technological features for digital information creation in multimedia formats.</p> <p><i>Integrating</i>: post-processing of recordings, digital annotations, automatic abstracting, etc.</p> <p><i>Correlating</i>: make connections, draw diagrams, mind maps</p> <p><i>Manage security issues</i>: manage privacy, intellectual property rights, and digital management rights.</p>	<p><i>Retrieving</i>: searching, reading, asking, listening, managing information abundance, managing cognitive overload.</p> <p><i>Searching/finding</i></p> <p><i>Storing</i>: deciding archiving media, considering resource availability and accessibility.</p> <p><i>Categorizing/classifying</i>: defining relations among pieces, using folksonomie.</p> <p><i>Evaluating</i>: extracting meaning, attribute relevance, affecting trust levels.</p>	<p><i>Publishing</i>: presenting relevant information, using appropriate publication channels (web sites, digital archives, blogs, ...).</p> <p><i>Mastering knowledge exchanges</i>: being concise, taking turns, focusing on topic, etc.</p> <p><i>Managing contacts</i>: keeping profiles, keeping contact contexts (social network representation).</p> <p><i>Relating with others</i>: establishing connections, effectively communicating through new media; understanding peers, using different languages.</p> <p><i>Collaborating</i>: sharing tasks, working to a common goal</p>

## Knowledge model supporting PKM skill acquisition

We also invoke a Knowledge Flow Model, derived from previous research on our part (Pettenati, 2007), which we intend to drive the design of learning activities related to PKM skill acquisition, as will be shown in the coming paragraphs. The Model, depicting a set of stages through which, in our specific context, knowledge flows, is presented in Fig. 1.



**Fig. 1.** The knowledge process in a connectivist environment: stages of the learning experience and enabling conditions. Source: (Pettenati, Cigognini, 2007).

Starting from the stage on the left side of the picture the flow runs through four stages, each step being reached thanks to the realization of some “enabling conditions”.

**Awareness & receptivity:** in this stage, individuals get used to "handling knowledge abundance", and are for the first time confronted with resources and tools of the new learning habitat.

**Making connections, selecting and filtering:** in this stage individuals begin to use tools and understanding acquired during the previous stage in order to create and give shape to a "personal network" of resources (people and contents). At this point the learners start to be active in the learning space in terms of "consuming or acquiring new resources and tools".

**Contribution & involvement:** in this stage the learner begins to actively contribute to the learning network — essentially, becoming a “visible node” and allowing other nodes on the network to acknowledge his resources, contributions, and ideas — creating reciprocal relationships and shared understandings.

**Reflection & metacognition:** Reflection on the knowledge processes and products, self-reflexivity and self-evaluation as well as metacognition (thinking about thinking) play a prominent role in this stage. Individuals are actively involved in modifying and re-building their own learning network, acting as "network-aware and competent" subjects (Siemens, 2006). The experience acquired at this stage within the network has resulted in an understanding of the nuances of the learning space and of the knowledge inputs. The subject is able to act both as a provider of valuable support to other networked learners as well as being capable of accessing just-in-time and personalized knowledge for himself.

## Web 2.0 technology model supporting learning design and PKM skills acquisition

The representation of web 2.0 technologies in figure 2 resumes the methodological framework of two different sources that we share and integrate in a social dimension-oriented perspective. The first one is by Heddergott: it gathers web2.0-tagged technologies on a Cartesian axis and relates user participation and therefore technologies socializing degree with the different areas of application<sup>1</sup> (Heddergott et al., 2006).

The independent variable in that scheme is bound to the design of the different educational scenarios. In place of areas, we substitute on the abscissa, part of the methodological proposal of the second model, the one used in the course of three training workshops promoted by METID<sup>2</sup> of Milan Polytechnic which groups “2.0” technologies in a 3-axis modelling (Sancassani et al., 2006). According to this view, we represented the web 2.0 technologies with respect to knowledge society skills: create, organize and share (see also prev. paragraph). For an in-depth analysis of technologies and their educational adaptations, refer to Fini (2006), Bonauti (2006) and Pettenati (2006a).

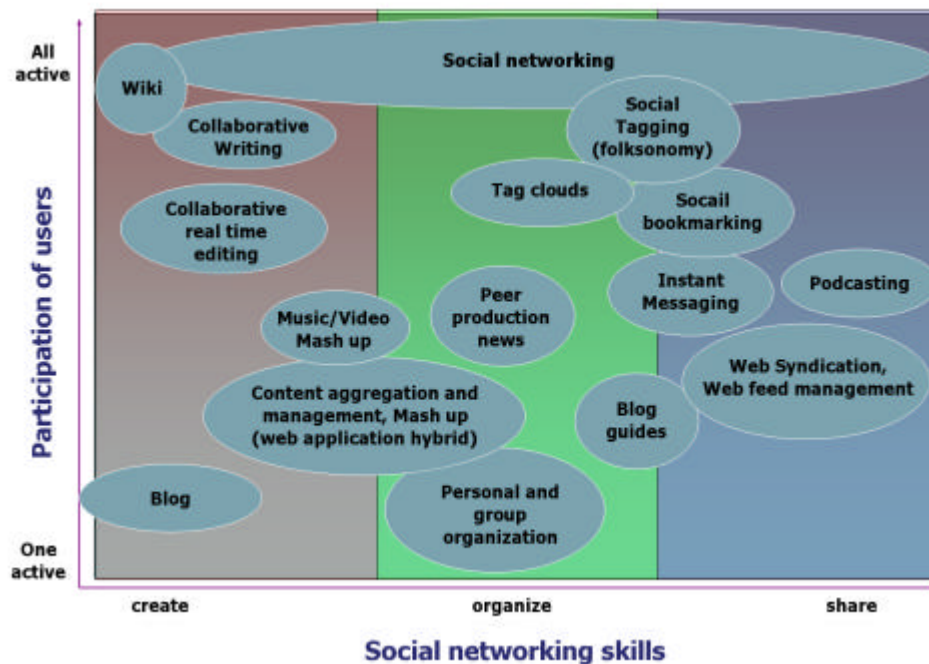


Fig. 2. Social networking technologies and PKM skills (adapted from (Heddergott, 2006)).

In the following paragraph we will instead concentrate on developing an examples scenario from the two models of Fig. 1 and 2.

### Scenario for PKM skills acquisition

The educational scenario set up represents an example of the ways in which formal and informal learning may lead to holistic and complete development of the PKM skills of a networked subject. In the following scenario, many of the innovative technologies of the so-called “social software” are now playing crucial role as a support to learning and knowledge processes.

**Scenario:** Students enrolled in the “PKM skills acquisition” class are required to work with contents related to “healthy cooking techniques”. They are assigned two activities: a theoretical and a practical one. The practical test concerns the preparation on a theme-based menu, while the theoretical one requires the production of a multimedia document related to the course

<sup>1</sup> Announcement of information; collection and systematisation of information; learning and education; social exchange; entertainment.

<sup>2</sup> Metid Center, <http://www.metid.polimi.it/> Work Shop “Classroom web 2.0” Net content construction, 13-19 December, 2006.

content.

The starting activity (ORGANIZE & SHARE) envisages menu preparation, so that members may get organized and carry out *connection forming*, *selection* and *resources filtering* activities. To this purpose, students are invited to use tools such as bookmarking and folksonomy of retrieved resources, wikis organized as historic logbook for group work reporting; in order to map students and related tasks, a “who does what “ table is constantly updated during ORGANIZE-type activities.

In the central phase of the scenario, the focus is on content production (CREATE): in order to develop a menu, members are invited to use a software for collaborative development of conceptual maps (*relating* activities). They also make use of some voice chat to follow the logical discourse thread of a session in a synchronous mode. The *Edit* activities are carried out in multimedia, personal and choral form: video-mashups on the different stages of dish creation, image study for graphic version of theme-based menu.

The ending phase (ORGANIZE & SHARE) is devoted to *Publishing* collaboratively created menus in the wiki (*collaborate*) and of the single courses in the personal blogs (*manage contacts*): Exposure to the different group presentations may be carried out in a conceptual map format which allows for profile, role and relationship and conceptual nodes vision during product exposure.

## Conclusions

Our objective is to provide a basis for the planning and design of learning activities (learning scenarios) in a social context. The resulting methodology takes into account the special characteristics of the contemporary landscape as it relates to knowledge and learning: the advent of web 2.0 technologies, a dynamic concept of knowledge (knowledge as a flow), the requirement to manage personal knowledge, the theoretical framework of connectivism. From our point of observation we detect and leverage an important social connotation when looking at the world of knowledge and learning. We argue that this key to reveal its implications and potential and therefore we have set it as the basis of our research. In this work we have presented the following elements:

- a Knowledge Flow Model, as a guideline to design learning activities oriented to develop PKM skills;
- a scheme for classifying competencies, three macro-competencies, each interpreted as the results of a number of PKM skills;
- a representation of social networking technologies seen under the perspective of the macro-competencies of PKM they enable;
- the dynamic analysis of a learning scenario (a course in “healthy cuisine techniques”), showing how the learners experience and develop the various paradigms contained in the model.

Our belief is that the knowledge society requires everybody to acquire of a set of PKM to become aware users of the network affordances (as citizens, as workers, as lifelong learners, as tourists, etc). Up to now, traditional educational has considered to various extents the problem of availing of telematic technologies to provide enhanced learning. Nonetheless, the issues of preparing students to properly master these technologies to derive the maximum advantages, has not yet entered in the formal educational activities.

Social networking tools and methods provide a tremendous opportunity and context to seamlessly fill this gap driving the subject into a learning and knowledge landscape in which PKM skills and competences are the enabling condition.

Independently from the fluctuating state of the concept of learning and of the technology roadmap, we believe that the approach we adopted is on the track to lead us to a true actualization of a lifelong

learning practice for all knowledge society members.

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