Towards a New Model for Knowledge Construction and Evolution

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INTRODUCTION

The 20th century has marked the transformation of the philosophical definition of knowledge into a new and different one. The new idea of knowledge mostly depends on the experiences and theories from human and social sciences like psychology, pedagogy, anthropology, sociology, and so forth. But many contributions to its specification are also due to biology, neurophysiology, telecommunication, cybernetics, and other scientific disciplines. In other words knowledge is today a complex matter and its analysis and definition depends on the observation fields one can use for its analysis.

Since the origins of philosophy Plato and Aristotle marked the difference between the different ways of constructing knowledge by proposing two alternative perspectives, that is, idealism and empiricism. The reasons for the philosophers' assumptions can be synthesized in two radically different viewpoints for the analysis of human-reality interaction: the former assigned to human mind the right of observing reality, interpreting and thinking about it with the use of well founded mental categories to arrive to the production and development of new knowledge, the latter assumed that reality is true by itself independently from human beings so that it has to be analyzed, measured and read, otherwise stated mankind has to interact with reality to know it.

During the centuries the ideas of idealism and empiricism cyclically alternated with more or less success until the 19th and 20th centuries when human sciences developed new ideas for the interpretation of knowledge phenomena. Today further elements coming from communication sciences and organization theory are adding to the aforementioned ones and make more complex and articulated the panorama of ideas on knowledge construction and development.

In what follows two different viewpoints for knowledge analysis will be proposed: the former concerning individuals, the latter organizations.

KNOWLEDGE AND INDIVIDUALS

J. Piaget (1971, 1973) and D. P. Ausubel (1990) are among the first scientists stating the importance of subjects' mental actions in cognitive processes. They assign a great role to the subject-reality interaction for the explanation of knowledge development and evolution; for this reason they are also considered cognitivists and precursors of constructivism (they are usually classified as the first interactive constructivists). They, on another hand, assign a little or no role to social and cultural interactions in knowledge construction and evolution. The ideas from J. Piaget and D. P. Ausubel have been verified, integrated and, sometimes, contradicted from further scientist but have retained all their importance for the role they assigned to individuals in knowledge management and development.

On a different basis moved D. H. Jonassen (1994), who founded the project of learning environments on the following statements: (a) knowledge construction is based on individual and social influences, (b) meaningful contexts support problem solving skills (which have to be derived from real situations), (c) cooperation between student and teacher and among peers is at the basis of learning processes. He also suggested the idea of cognitive apprenticeship as a teaching-learning strategy strongly based on the experience and the reflection on it.

Further studies introduced the concepts of multiple intelligence (Gardner, 1993), learning styles (Mc Lellan, 1996) and cognitive flexibility (Spiro & Jehng, 1990), to consider the complexity of the cognitive phenomenon into individuals.

The importance of context and social effects on individuals' knowledge construction and development has been stated in many other studies, often under the influence of L. Vygotskij and A. N. Leont'ev hypotheses (Varisco, 2002). The first assigns a leading role to language and social interactions and hypothesizes the presence of ZSP (zones of proximal development) to mark the differences existing among the differently

skilled subjects in a community. The latter is better known for his activity theory, where subjects work on objects in order to obtain a desired outcome; to do this people employ tools, which may be external (i.e., a material instrument) or internal (plans, etc.). Y. Engeström (1987) proposes a scheme of activity different from that by Leont'ev because it contains three interacting entities: the individual, the object, and the community.

The most recent theory on the influence of social phenomena on human knowledge and learning is the E. Wenger's (1998) social learning theory. This theory has at its basis the following principles: (a) individuals are social beings and are the focus of the learning action; (b) knowledge is a specific aspect of competence; (c) knowledge is the expression of the participation; (d) meaning is the product of learning. If these ideas are mostly concerned with the effects of learning actions on individuals it has to be noted that E. Wenger looks at communities as autonomous realities and, for him, communities of practice coincide with learning communities.

CORPORATE AND ORGANIZATION KNOWLEDGE

While starting from Wenger's research on communities of practice recent studies analyze knowledge construction in those communities for the importance they have in corporate and organizations. In other words a theory of knowledge construction and development in communities has been developed, autonomously from the hypotheses on knowledge construction in individuals reported in the above paragraph.

Among the starting points for these studies there are Wenger's (2004) basic elements marking a community of practice: (a) shared identity domain, where membership implies a commitment to the domain, and therefore a shared competence that distinguishes members from other people; (b) community, because in pursuing their interest in the domain, members engage in joint activities and discussions, help each other, and share information; that is, they build relationships enabling them to learn from each other; (c) practice, because members of a community of practice are practitioners; they develop a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems (in short a shared practice).

With respect to studies on individuals' knowledge development, new hypotheses were now developed to explain knowledge features and structure within communities and organizations. I. Nonaka and N. Konno (1999), for example, based their ideas on the definition of two different kinds of knowledge: (a) tacit knowledge, which is deeply-rooted in actions and experiences of community's members and can be only difficultly codified, transmitted and shared; i.e. it is the individuals' "know how" marking the skills of the community, (b) explicit knowledge, which is the community's knowledge and can be easily formalized, represented, transmitted, and shared.

Activity theory intervenes on the difficult problem of learning and, particularly, on tacit knowledge by suggesting that organizational learning process includes preliminary stages of goal and problem formation (Engeström, 1997).

As regards learning organizations, that is, organizations continuously developing new knowledge, I. Nonaka and H. Takeuchi (1995), developed a model for knowledge construction and evolution strongly based on the tacit and explicit knowledge transformations. This model is made by four phases (which initials give the name SECI to it): (1) socialization, it is the informal process letting tacit knowledge be shared (often in nonverbal way). It has features very similar to the modeling phase of apprenticeship and to the on-the-job-training used in many organizational contexts, (2) externalization, it transforms tacit knowledge in explicit concepts and is the crucial phase of knowledge construction. Formal language, metaphors, and analogies play an important role in helping people making explicit their know how, (3) combination, it inserts the newly built concepts into organization's knowledge and connects them to previous knowledge, so increasing the knowledge of the community and of the organization, (4) internalization, it closes the cycle by making internal the explicit knowledge and transforms it into know how for the organization.

THE ROLE OF IT AND ICT ON KNOWLEDGE CONSTRUCTION AND EVOLUTION

As regards the influence of IT and ICT on individual teaching-learning processes it has to be remembered here the contributions from R. Taylor (1980) and L.