

# Influence on Knowledge Construction

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## INTRODUCTION

It is well known that computers, information technology (IT), and information and communication technology (ICT) strongly influenced individuals and communities in their ways of knowing and transmitting knowledge. The impact the above instruments had on human activities has been often compared to other historical revolutions such as alphabet and printing inventions for the effects they produced and are still producing. In what follows, the ICT intervention on the interpretation of knowledge construction/transmission processes for individuals, communities, and society will be shown. Furthermore, possible scenarios for ICT impact on knowledge/learning processes will be drawn.

## BACKGROUND

The contribution of philosophy to knowledge analysis and interpretation has its origins in Plato's and Aristotle's hypotheses and continued during the centuries until Kant, Hegel, and the more recent 1900's theories. The second half of 1900s has been marked by the transition from a positivistic idea of knowledge, absolute and unchangeable with the time and expression of the human-kind process of discovery of natural laws, to a more flexible and sometimes relativistic approach to its construction and transmission. Together with the above interpretations of knowledge have to be remembered here three main aspects of knowledge phenomena, that is, the individual, social, and organizational processes of knowledge construction and sharing.

In what follows, a description and a comparison among the various perspectives are proposed.

### From Behaviorism to Individual Constructivism

The birth of human sciences such as psychology, sociology, pedagogy, anthropology, and so forth, gave new perspective to knowledge explanation, but also when instruments and methods of human disciplines were applied, the results scholars obtained were strongly influenced from the positivistic environment of those years. As a consequence the hypotheses following one another

in that period had the main result of building a unique and absolute theory of knowledge.

Three main schools of thinking can be recognized among theories explaining knowledge development. First of all, behaviorism reduced knowledge construction and settlement to the use of adequate stimuli and appropriate reinforcement actions. Second, cognitivism assigned a great role to human interaction with reality and to mental processes. Finally, we have constructivism, whose main tenets can be summarized as follows (Greening, 2000):

- Meaning is not transmitted (learning occurs as a process of adjustment of existing concepts)
- Understanding is based on interaction among a complex weave of factors (i.e., the learner's goals and existing concepts, the content of the learning experience, the context in which the learning takes place, etc.)
- Puzzlement motivates learning (the sense of dissatisfaction emerges from experiences that threaten existing conceptual structures)
- Social negotiation and viability are the principle forces involved in the evolution and construction of knowledge

The above tripartition collects and systematizes the various contributions concerning individuals' knowledge analysis and explanation, but as it can be easily shown, not all scholars can be rigidly set in that scheme. As an example, the ideas of J. Piaget and D. P. Ausubel who are usually considered cognitivists and precursors of constructivism are reported here. J. Piaget (1971) suggested the theory of genetic epistemology to interpret the philo-ontogenetical evolution of the subject and stated that learning is the result of a continuous process of assimilation and settlement. D. P. Ausubel (1990) suggested, on another hand, the existence of two main types of learning: the mechanical learning and the meaningful learning, both depending on previous knowledge and on the ways the subjects use to build new knowledge. More recent studies, often under the effect of new technologies' introduction in education (multimedia, hypertext, etc.), enriched the field of cognitive theory and gave rise to the concepts of multiple intelligence, learning style, and cognitive flexibility (Gardner, 1993; McLellan, 1996; Spiro & Jehng, 1990).

Together with the above studies it is useful to remember here the following hypothesis reported by many authors: working at a computer stimulates functions' development more than learning topics so that metacognitive attitudes are developed from individuals systematically using a computer (Cornoldi & Caponi, 1991).

At last the recovery of the experience of traditional apprenticeship and its application to educational contexts with the consequent definition of cognitive apprenticeship has to be remembered; its main features are the well-known ones, marking Renaissance craftsmen studios (modeling, coaching, scaffolding, and fading), together with the new ones: articulation, reflection, and exploration.

### **From Individual to Social Constructivism**

Most part of the above theories state that the subject plays an active role in the cognitive process but assign less or no relevance to social and cultural interactions. In what follows a summary of the hypotheses suggesting the influence of social phenomena on knowledge is reported.

L. Vygotskij (1980) recognized the importance of the historical-cultural matrix for the development of individual knowledge. He hypothesized that spontaneous learning (due to experience) develops before school learning (which is social) and stated that education is effective if a) it anticipates individual's development and b) it fills the ZPD (zone of proximal development). In other words when a subject acts socially in the solution of a problem that he/she is not able to autonomously solve, then he/she gets hold of new cognitive instruments.

A. N. Leont'ev (1977), disciple and successor of Vygotskij, introduced the idea of activity (under a well-defined form, structure, and condition, all depending on social interactions) as an action mediated by purposes; for Leont'ev the activity substitutes words as early knowledge units and early structural elements of human knowledge.

In the 1980s, cognitive and learning practices were analyzed outside the school context in the cultural-contextual psychology area. The activity theory of Leont'ev found application in many studies and produced the situated-cultural approach to learning, which explicitly applied to communities of practice (CoPs). As regards CoPs the Laboratory of Comparative Human Cognition (LCHC) (1982) and M. Cole (1996) considered the context in the analysis of learning experiences and hypothesized the presence of a shared elaboration system (connecting the individual learning experience to the corresponding performance by means of special schemas); this idea was clearly in contrast with the contemporary idea of a unique

and absolute cognitive style (emerging from the culture the subject belonged to). One of the most relevant aspects of the situated-cultural approach to learning is represented by the concept of membership. J. Lave and E. Wenger (1991) analyzed membership and especially legitimate peripheral participation (LPP) and stated that all members of a community have the same rights and are legitimated in participating to all resources and practices of the community. Further studies on the communities of practice led Wenger (1998) to his theory of social learning essentially based on the idea of identity; it consists of identification and negotiability between a subject and a community and fulfills in different modes of belonging: engagement, imagination, and alignment.

As regards learners' communities, often identified with school classes and groups of students, many studies focused on the analysis of the differences between in-school and extra-school learning. A. L. Brown and J. Campione (1994), for example, stated the structure of a community of learners (CoL). It is made by students, teachers, tutors, and experts who are organized in a community within which previous knowledge is analyzed, verified, and discussed and new knowledge and theories are built. Soon after the same authors modified their idea of CoL and proposed the concept of fostering community of learners (FCL), which is based on a system of interactive activities within a learning environment where conscious and reflexive works are made (Brown & Campione, 1996): research, information sharing, and suitable exercises are for the authors the basic elements for the development of reflection and deepen learning.

D. Jonassen (1995), on another hand, stated that knowledge construction (internal and external negotiation), context (meaningful and authentic environment), and cooperation (among students and teachers) are the basic elements for the definition of an environment leading to meaningful learning (which has to be active, constructive, cooperative, intentional, conversational, and reflexive).

### **Communities of Practice and Knowledge Management**

While starting from the above premises but under a greater influence of relativism and in a different context (the corporate and organizational ones) many studies analyzed CoPs and the interactions acting among the individuals belonging to them and among the communities themselves and founded the bases of the knowledge management (KM) theory.

Denning (2000) while summarizing the results of many experiences stated the following laws for KM: (1) knowledge is the basic element for the survival of the organiza-

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