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## **The Concept of Knowledge for a Knowledge-based Society**

From knowledge to learning

**Ernesto Villalba**

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## **1 Introduction**

Knowledge and how people acquire knowledge has fascinated human beings from the ancient Greeks to our day. With the emergence of the so-called knowledge economy, knowledge has become one of the most fashionable terms in the political and managerial sphere. As Weiler (2001, p. 36) put it: “The politics of knowledge become less and less separable from the politics of production and profit, arguably the most powerful political dynamics in today’s world”. Halal’s (1997, p. 2) enthusiastic words show this central role of knowledge in the new way of seeing the organization: “We see now that knowledge is the most strategic asset in enterprise, the source of all creativity, innovation and economic value”.

The present paper will present different views on knowledge, focusing mainly on the literature derived from management studies. In this way, the present paper can be seen as a mapping of the different ideas that management literature (and hence entrepreneurship literature) have put forward when referring to knowledge. The main focus will be on knowledge management approaches, since this field of study has been very much involved in relating knowledge to managerial practices. Managing knowledge can be seen as the crucial aspect of the so-called “knowledge economy”, and hence it has strong influence on innovative practices.

The paper is organized as follows. First a brief introduction on epistemological ideas is presented. Three main approaches to epistemology are proposed in a broad sense: innatist/introspection, empiricism/behaviorism and critical philosophy/constructivism. Special emphasis is placed on constructivism since it is argued that it is the predominant view nowadays. Afterwards, knowledge is conceptualized from a managerial perspective. More specifically, the paper differentiates between several knowledge-related terms, such as data, information or expertise. The distinction between tacit and explicit knowledge is also addressed. The paper finalizes summarizing main characteristics of knowledge and its relationship with learning.

## **2 Epistemological approaches and the psychology of knowledge**

### ***2.1 Three main epistemological approaches***

The studies made of philosophy and the history of philosophy are countless. It is not the intention of this section to present a long, comprehensive view of the different theories, but to present the bases for the position defended in this paper. One could argue that there are main approaches in traditional epistemology. The first has its origins in Plato and is based on the idea that knowledge exists independently of empirical reality (see e.g. Ackrill, 1973/1997; O’connor and Carr, 1982; Kenny 1994). Descartes would be in line with this position too (see e.g. Markie, 1998; Garber, 1998). The second is referred to as the empiricist approach. Here Aristotle is the main figure and he contends that knowledge is created through experience (see Smith and Rose, 1908; Lear, 1988). And finally a third approach, mainly represented by Kant, which would be placed between the two previous ones, holds that knowledge is a combination of experience and inner capacities (see e.g. Kant, 1781/2003; Stegmüller, 1977). This is obviously an oversimplification of the approaches, reducing them to some specific characteristics that make them similar. A deeper analysis would be needed in order to fully understand the work of the different authors presented, such as Plato, Aristotle and Kant, but here only few specific aspects of their theories are considered.

More recently, the field of psychology has made some interesting contributions to the field of epistemology. Three main approaches have been proposed in classical epistemology, and similarly, three main approaches to psychology are presented: (1) psychology of the inner mental world, corresponding to the epistemology of Plato and Descartes, (2) behaviorist psychology, corresponding to traditional empiricism, and (3) constructivist psychology, related to the third approach to epistemological thought: critical rationalism. The first approach in psychology combined contributions from quite diverse authors: Wundt, Köhler and Freud. It is argued, however, that all of them share the conviction that the inner mental world is crucial in understanding the nature of knowledge. For them, knowledge is in one way or another generated mainly from the inside out. This approach to

psychology, therefore, considers an inner world that is partially (if not totally) independent of empirical reality. Knowledge is mainly produced inside our heads from our own resources.

Behaviorism is a psychology tradition rooted in physiology. Behaviorism has its basis in Pavlov's work on classical conditioning (see e.g. Pavlov, 1904 or 1928). For Watson (1924, p. 5),

behavioristic psychology attempts to formulate, through systematic observation and experimentation, the generalizations, laws and principles which underlie man's behavior.

Behaviorism is, therefore, not so much concerned with knowledge as it is with behavior. However, learning has a central role in their theories, since learning is the result of a successful training process, in which the conduct has been modified. Skinner, in his work with animals, especially pigeons, managed to "teach" them to get food by pressing a button. This "intelligent" behavior elicited the correct reinforcements – giving food – when the pigeon produced the correct response – pressing the button. Skinner (1953, p. 153) argues:

The whole process of becoming competent in any field must be divided into a very large number of small steps, and reinforcement must be contingent upon the accomplishment of each step... By making each successive step as small as possible, the frequency of reinforcement can be raised to maximum, while the possible aversive consequences of being wrong are reduced to a minimum.

Behaviorists claim that the human mind cannot be studied; only its consequences, behavior, can be empirically studied (Saettler, 1990, p. 13). The different types of reinforcements that we receive will shape our behavior. Thinking is for the behaviorists "sub-vocal talking", just one type of "implicit habit responses" (Watson, 1924, p.15). Knowledge is therefore external to the human mind; it occurs "from the outside-in"; it is the association of stimulus and responses (Shuell and Moran, 1996, p. 3340). Complex learning occurs through the operant conditioning of different sequences of responses.

### ***Constructivism***

The third approach to psychology proposed here consists of an intermediate paradigm between the two previous approaches. It is the one that inspired the approach used in this paper, and it is, therefore, presented in more detail. Piaget is probably the most prominent exponent of this approach. He is one of the writers on education who is most frequently cited. His genetic epistemology has had, and still has, a great influence on curriculum design, educational theory and development psychology (Perner, 1996). Goldman (1969, p. 15) argues that Piaget's ideas are based on Kant's epistemological framework. As Saettler (1990, p. 73) has noted, according to Piaget cognition developed through the continuous interaction between learner and environment. For Piaget, the mind operates with schemas, certain patterns of behavior, a "script" that guides our actions in a given context. The adaptation of our schemas to different realities constitutes the process of learning (see e.g. Piaget, 1977). The schema will guide the person's behavior within a given context (for example, how to behave in a restaurant). When confronting a new object or situation the script will assimilate or accommodate the new object or situation. Piaget defines assimilation as "the incorporation of objects into patterns of behavior" (Piaget, 1950, p. 9); this means that the script grows, adding a new object (or situation) where the script will be functional. For example, assimilation occurs when a child is confronted with a pencil. The child can use the schema "grab and thrust" that s/he has already used with other similar objects. Using the schema will be successful, and therefore, the object "pencil" will be incorporated into the functional schema of "grab and thrust". Accommodation, on the other hand, occurs when the application of previously known schema to a given object is not successful; for example, the child cannot use the schema "grab and thrust" with a big ball. In this case, it is the "script" that changes, and the child will accommodate his/her schemata to the ball (see e.g. Flavel, 1963; Boeree, 2002). For Piaget (1950, pp. 9-10) this process of accommodation and assimilation is the process of adaptation and further, the process of learning:

We can define adaptation as an equilibrium between assimilation and accommodation, which amounts to the same as an equilibrium of iteration between subject and object... Psychological life... begins ... with functional interaction, that is to say, from the point at which assimilation

no longer alters assimilated objects in a physico-chemical manner but simply incorporates them in its own forms of activity (and when accommodation only modifies this activity). The whole development of mental activity ... is thus a function of this gradually increasing distance of interaction, and hence of the equilibrium between an assimilation of realities further and further removed from the action itself and an accommodation of the latter [action] to the former [realities].

Piaget proposes a human mind developed through an interactive process between the representation of the reality and the “response” of the reality when we act. Mental development implies that the “scripts”, the schemas, the representation of the reality that guides our actions, become more abstract and less fixed in the specific action.

Shute (1996, p. 3322) defines schemas as an “interconnected set of propositions and concepts representing a situation”. Schemas compound mental models that are “a highly organized set of propositions, concepts, and rules for relating them to one another” (Shute, 1996, p. 3323). Some authors have referred to these mental models as implicit theories (see Chi, Glaser and Farr, 1988). Implicit theories constitute a representation of the world, a map where the different concepts are placed; in fact, they will guide how we confront reality.

When we act, new information is processed and will produce some kind of disequilibrium or cognitive conflict in the schema or theory. The process of adaptation (assimilation or accommodation) will tend to restore the equilibrium. Piaget (1975) maintains that adapted responses to this disequilibrium can be of three types: *alfa*, *beta* or *gamma*. Limón (2001, p. 359) explains the three responses as follows:

Alpha answers involve individuals who ignore or do not take into account the conflicting data. Beta answers are characterized by producing partial modifications in the learner’s theory, through generalization and differentiation (generating an “ad hoc” explanation). Finally, gamma answers involve the modification of the central core of the theory.

The *beta* and *gamma* types of learning relate to what Ausubel and Robinson (1969, p. 57) called meaningful learning, which refers to learning of “materials that can be *meaningfully* incorporated into cognitive structure” (emphasis added). The change in this cognitive structure has also been called “conceptual change” (see e.g. Vosniadou, 1996; Sinatra and Pintrich, 2002).

Piaget’s theories have usually been criticized for not taking into account the social context where learning takes place (Hagström, 2003, p. 4). In this sense, Vygotski is the other main figure in constructivism. His view of child development has usually been referred as social constructivism. For him, the child builds her/his high mental processes with the help of an adult. In fact, as Ardichvili (2001, p. 35) maintains,

in Vygotski’s view, mental functioning in the individual can be understood only by going outside the individual and examining the social and cultural processes from which it derives.

For Vygotski, learning occurs first in an interpersonal manner and then it is internalized. His theory of the mind follows a stratified system of development where the concept of a “Zone of Proximal Development” becomes central; he defines it as:

actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers (Vygotski, 1978, pp. 85-86).

Therefore, in Vygotski’s view, mental development is the result of interaction with the environment, but is mainly mediated by social agents. In this way, language becomes the main tool in constructing the mental structure. Thus language and thinking are co-constructed (Riviere, 1997).

## **2.2 Understanding knowledge from a management perspective**

The previous section presented three epistemological approaches. This section will present the position of business administration literature towards knowledge. Especial focus will be on knowledge management literature. In recent years, almost every book or article about knowledge management begins by referring to knowledge. It is necessary to inquire about how knowledge management

theorists and practitioners. Before discussing the conceptualization of knowledge it is important to make certain distinctions that are recurrent in the field. In order to understand what knowledge is, it is important to differentiate it from the type of knowledge implied by other related terms such as information and data, and to explain different types of knowledge.

**Data, Information, Knowledge and Expertise**

The first distinction, commonly addressed in the literature, is between knowledge, information, data and expertise. Figure 1 shows the classical hierarchical positions of the concepts (Bender and Fish, 2000). Data constitute the bricks from which the pyramid of knowledge is built. Davenport et al. (1998, p. 2) define data as “a set of discrete, objective facts about events”. Most of the knowledge management literature agrees with this definition (see Tuomi 1999, p. 104-105 for a review). Data constitute all the empirical reality that is presented to us in our daily experience, the “ocean of impressions” in Kant’s terms. In managerial terms, data are that which are available without much restriction in the knowledge society, on the Internet, in databases, and in daily activities. Bender and Fish (2000, p. 126) point out that data become information only when they have been imbued with meaning, understanding, relevance and purpose.

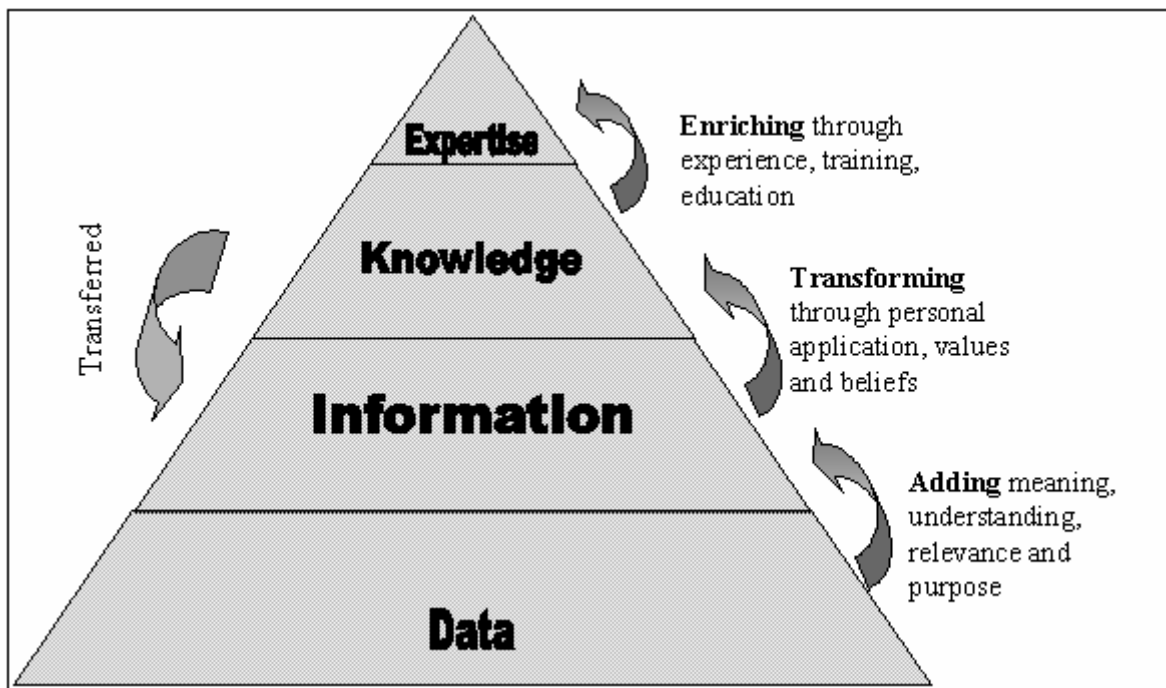


Figure 1: Knowledge hierarchy. (Bender and Fish, 2000, p. 126).

Wiig (1993, p. 81-82) maintains that information is “full or partial description of the state or condition of a situation” and he agrees with Cleveland (1985, p. 24), who says: “information is organized data – organized by someone else, not by me”. For Drucker (1988, p. 46) “information is data endowed with relevance and purpose. Converting data into information thus requires knowledge”. Mårtensson (2000, p. 208) makes the distinction between general information and contextual information. While general information is data that are organized and structured, contextual information is created by filtering and organizing general information to meet the requirements of a specific community of users.

Information is transformed into knowledge when the individual processes it and internalizes it. New information has to be integrated into the individual’s existing knowledge structure in order to produce learning. In Piaget’s terms, the new information can be either accommodated or assimilated. If

the new information is assimilated there is a change in the content of the schema. We add the information into our schema, but the schema does not change dramatically. If accommodation occurs, the new information triggers a change in the structure of the schema. A new schema means that the reality that the information refers to is looked upon in a different way. In this way, schemas “form the basis for comparing and interpreting incoming data” (Shute, 1996, p. 3322).

Finally, if one masters a certain subject or area of knowledge, s/he will become an expert. Alexander (2003, p. 3), in her review of psychology research on expertise, maintains that experts are people who:

- possess extensive and highly integrated bodies of domain knowledge,
- are effective at recognizing the underlying structure of domain problems,
- select and apply appropriate problem-solving procedures for the problem at hand, and
- can retrieve relevant domain knowledge and strategies with minimal cognitive effort.

Wiig (1993, p. 163) refers to the proficiency dimension to explain levels of expertise with regard to knowledge. He proposes seven different categories from beginner to “grand master”. He differentiates between expertise and wisdom. Expertise refers to “specialized knowledge and skills in a particular area” (Wiig, 1993, p. 84) whereas wisdom involves, in addition to a high level of knowledge in a specific area, certain personal characteristics such as the willingness to learn or to be flexible (Wiig, 1993, p. 85).

Tuomi (1999) criticizes this classical hierarchical conception of knowledge and information. He argues that all these models consider knowledge as a “higher form of information” (Tuomi 1999, 104). For Tuomi (1999, p. 107), “data emerge last – only after knowledge and information are available. There are no ‘isolated peaces of simple facts’”. He turns the pyramid upside-down. Once knowledge is articulated, verbalized and structured, it is transformed into information. Information is transformed into data when it is placed within certain predefined structures (see figure 2). Curry (1997) arrived at a similar conclusion through the analysis of management literature of knowledge using a Marxist rationale.

In this paper, the relationship between information and knowledge travels in both directions: knowledge is made explicit and becomes information, while information is internalized and becomes

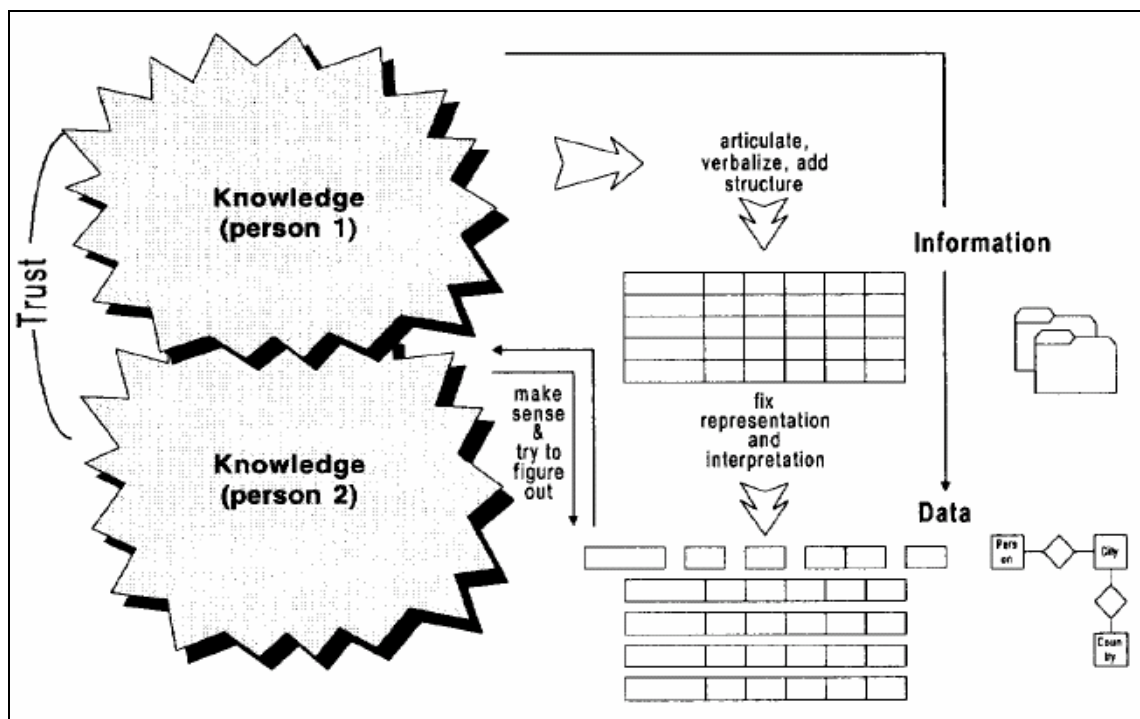


Figure 2: reverse knowledge hierarchy (Tuomi, 1999, p. 112)



knowledge. Thus, Tuomi's view does not exclude the classical hierarchy model, but complements it (Tuomi, 2002).

### *Explicit and tacit knowledge, the public and the private*

Tuomi's arguments are based on a highly influential dichotomy of tacit versus explicit knowledge. The distinction between tacit and explicit is probably the one most frequently referred to in the knowledge management literature. The work of Polanyi is extensively quoted and referred to in this matter (See e.g. Hislop 2002 or Jasmuddin *et al.* 2005 for a review). For Polanyi (1967, p. 4) "people know more than they can tell". In this simple way Polanyi defines what he calls tacit knowledge as opposed to explicit knowledge that can be expressed (see also Polanyi, 1969). For Polanyi (1962, p. 601-602, emphasis in the original) any activity has two dimensions of knowledge:

(1) knowing a thing *by attending to it*, in the way we attend to an entity as a whole and (2) knowing a thing *by relying on our awareness of it for the purpose of attending to an entity to which it contributes*. The latter knowledge can be said to be *tacit*... We may call "knowing by attending to" a *focal* knowing, and "knowing by relying on" a *subsidiary* knowing... What is subsidiarily known is tacitly known; but it seems appropriate to extend the meaning of "tacit knowing" to include the integration of subsidiary to focal knowing... [A]ll knowing ultimately relies on a tacit process of knowing.

Sveiby (1997) defines focal and tacit knowledge more clearly. Focal knowledge is knowledge of a specific thing, while tacit knowledge is "the knowledge that is used as a tool to handle what is being focused on" (Sveiby, 1997, p. 30). Nonaka is probably the first to promote the importance of tacit knowledge (see e.g. Nonaka, 1991, 1994). Tacit knowledge is crucial in fostering innovation in Nonaka's model. The spiral of knowledge creation that he proposes is based on the transfer from tacit to explicit knowledge and from explicit to tacit (see Nonaka, 1991; Nonaka and Takeuchi, 1995; Nonaka *et al.* 1996). For Li and Gao (2003, p. 8), however, Nonaka's model is more concerned with the implicitness of knowledge than with the "tacitness" of it. For them,

tacit knowing is such elusive and subjective "awareness" of individual that cannot be articulated in words ... [while] implicitness ... implies that one can articulate it but is unwilling to do that because of specific reasons under certain settings (such as intrinsic behavior in perception, cultural custom, or organizational style).

From the point of view of this paper, Li and Gao fail to understand that the tacit dimension in Nonaka's work is referring not only to a set of routines that are not, or do not want to be, expressed, but is also referring to schemas that framed the action in Piaget's terms.

Karmilof-Smith and Inhelder (1974) use the term theory-in-action in psychology to refer to the schemes that are guiding the action in certain situations without us being conscious of them. In organizational theory, Argyris and Schon (1974) used the same term for the theories that guide our interpersonal behavior and influence our ways of learning. Later, Argyris (1993) referred to governing values as the principles that guide judgments and actions. Senge (1990) refers to "mental models" as the conceptual structures that drive cognitive processes. Dweck (1999, p. ix) talks about self-theories as a set of meaning systems: "people develop beliefs that organize their world and give meaning to their experiences". This is similar to what Wood (2001) refers to as implicit theories of managers. What is proposed here is that the governing values, theory-in-use, implicit theories and Piaget's schema are all referring to the same thing: tacit knowledge. What these terms have in common is that they constitute certain structures of the mind; they constitute our ways of understanding the world. Further, these schemas guide our actions and the manner in which we look at data. These schemas are not only cognitive, but they also have an important motivational and sentimental component (Pintrich and De Groot, 1990; Pintrich, Marx and Boyle, 1993; Mezirow, 2003). People feel attached to their theories-in-use since they are an important part of their ways of being.

Tacit knowledge is not public but private in the sense that only the individual possesses it. It belongs to the individual and only the individual can fully use it (Leonard and Sensiper, 1998). Mayo (2000) maintains that all knowledge always has certain private components. In a similar vein, Bender and Fish (2000) maintain that the transfer of expertise always implies a transfer of the expert

her/himself since it is never possible to totally articulate all knowledge. Nonaka and Takeuchi (1995, p. 64) call the process of making implicit knowledge explicit “externalization”. For them, “tacit knowledge becomes explicit taking the shape of metaphors, analogies, concepts, hypotheses or models”. They maintain that there is always certain knowledge that cannot be articulated:

Yet expressions are often inadequate, inconsistent and insufficient. Such discrepancies and gaps between images and expressions, however, help promote “reflection” and interaction between individuals (Nonaka and Takeuchi, 1995, p. 64).

In similar terms, Sveiby (1997, p. 34) maintains “because we always know more than we can tell, it follows that what has been articulated and formalized is less than what we tacitly know”. Wiig (1993, p. 74) refers to tacit and explicit knowledge as internal and external knowledge respectively. In his review of the literature on knowledge management, Spender (2002, p. 151) proposed two approaches in viewing knowledge within the field:

One in which knowledge is conceived to be ultimately objectifiable, understandable in a scientific sense, and a second, less explored domain wherein the term knowledge is considered to extend beyond that which can ever be objectified or otherwise made explicit.

Using the above distinctions of tacit and explicit knowledge, in the first approach knowledge and information would be seen if not as the same, then as interchangeable. Knowledge can always be translated into information and all knowledge can be made explicit. In the second approach, knowledge cannot be totally explicit, since there is always a subjective component. Although Spender (2002) argues that the distinction between tacit and explicit knowledge is different than the distinction between the two approaches, it seems clear that these two approaches correspond to the emphasis on explicit knowledge versus the emphasis on tacit knowledge, respectively. An emphasis on explicit knowledge will very likely assume that all knowledge is ultimately objectifiable, or that at least the important knowledge is.

Hislop (2002) divides the knowledge management approaches into “objectivist” and “practice-based” philosophies of knowledge that would correspond to Spender’s first and second approaches, respectively. In Hislop (2002) these two philosophies of knowledge recognize a different relationship between tacit and explicit knowledge. The objectivists argue that knowledge equals information, while practice-based philosophy makes a clear distinction. Jasimudin et al. (2005) maintain that objectivist theorists consider tacit and explicit knowledge to be two different categories, while practice-based philosophy perceives knowledge as a continuum. Jasimudin et al. (2005, p. 104) position themselves within the second tradition; for them, all knowledge “has both tacit and explicit components”, which would be in line with Polanyi’s assumptions (see e.g. Polanyi, 1962 or 1967).

It seems therefore that there are two clearly defined groups in the literature: one where knowledge is perfectly translated into information, and another where there is always a tacit component in knowledge. These two domains correspond roughly with the behaviorist/empiricist and the innatist/rationalist approaches. The former sees knowledge as objective while the latter sees it as subjective.

For the present paper, tacit and explicit knowledge are seen as necessarily different and they cannot be regarded as poles in a similar dimension. All knowledge is tacit at some point in time (it is not being expressed), and certain components of this knowledge cannot be expressed; however, once it is made explicit, this tacit knowledge is transformed into explicit knowledge, that is, information to the listener/reader or whoever can understand the code under which the knowledge is codified. Thus, tacit and explicit knowledge are exclusive categories. Specific knowledge at one point in time is either tacit or explicit. Using Piaget’s perspective, knowledge is understood as both the schema and the content of the schema. The content of the schema will be easier to make explicit in some instances since it is declarative knowledge, and by definition it is easy to declare. The schemata, on the other hand, possess certain aspects that cannot be expressed properly, and further, we are not aware of some parts of the schemata. Hislop (2002) views this perspective as pertaining to the objectivist theory. However, from my point of view, he fails to understand that the knowledge expressed is by definition explicit knowledge. It does not have tacit components; it comes from tacit knowledge, but in expressing,

writing or even drawing a picture of it, one is making the tacit knowledge explicit. I agree with Hislop that this knowledge expressed is not and cannot be a perfect replica of one's tacit knowledge. It is true that the knowledge one expresses has tacit components, but only to the person in question, and not to anyone else. For anyone else, this "explicit knowledge" is information. Thus this paper agrees with Hislop's (2002, p. 167) statement about the objectivist theory that: "tacit knowledge and explicit knowledge are argued to possess completely different characteristics and are shared in completely different ways as well", despite the fact that this paper is not at all within an objectivist tradition.

Two main characteristics are apparent from the previous conceptualization of knowledge. Firstly, knowledge is *embodied in the individual* and secondly, as a consequence, knowledge must be studied in a *particular context*. The individual processes the data, the information, and adds to the information his/her own previous knowledge, beliefs, values, etc. In Piaget's terms, the schemata are in the human mind, and it is in the human mind that the schemata have to adapt to new realities. Knowledge is something that one constructs by him/herself in an interaction with the environment and with others.

Articulated explicit knowledge is, therefore, public in the sense that it is accessible to anyone who can understand the code in which it is written, as opposed to knowledge that is private (such as tacit knowledge), which is only inside one's head. In other words, knowledge becomes information when it is made explicit. Explicit knowledge and specific information, as defined by Mårtensson (2000), are two sides of the same coin. When I am writing, or talking, I articulate my knowledge; that is, I am "externalizing" tacit knowledge into explicit knowledge. However, the receptor of my explicit knowledge, in this case the patient reader, is reading *information*, and only if s/he adapts (assimilates or accommodates) this information into his/her schemata or theory will the information become knowledge.

This knowledge acquisition process is, therefore, an individual process, since it is the reader who will or will not process the information read. Knowledge, by definition, is in someone's head, and when it is not in someone's head it is information or data (see figure 3). Further, it is important to note that the information can never be a perfect replica of the knowledge the individual has, and different individuals will have different ways of approaching the same information.

However, as already mentioned, certain meanings have to be shared in order for people to understand each other. Vygotski's theory maintains that knowledge is interpersonal before being individualized knowledge. Linguistic theorists, such as Saussure and Pierce, maintain that communication is only possible because the transmitter and receptor share the code and the context, where certain implicit meanings are shared (see e.g. Buchler, 1955; Hookway, 1995). It is therefore debatable to what extent knowledge is individualized. Demarest (1997) maintains that there is a "shared knowledge" that all people in each organization share and understand. Likewise, Wiig (1993) talks about organizational knowledge or embedded knowledge. Von Krogh and Roos (1995) refer to organizational knowledge socialized as the knowledge of the social system *per se*.

This paper presents a rather individualistic view of knowledge. In this way, knowledge is always private in the sense that it belongs to the individual. Some authors believe that there is knowledge independent of the individual; this is called collective knowledge or organizational knowledge (von Krogh et al. 1996). The present paper maintains that knowledge is never outside of an individual; what is outside is information. Collective knowledge is therefore defined here as similar knowledge in different people's heads; there is no supra-individual knowledge. If knowledge is shared, what is being shared is information. In the present work, "shared knowledge" is understood as knowledge that is inside the individual, but is similar to the knowledge of other individuals. It is argued here that the more communication that exists between the different individuals within an organization, the more likely it is that their tacit knowledge is similar. Communication intensiveness is therefore regarded as an important factor in creating common understandings. Nonaka maintains that knowledge can be tacitly shared when, for example, two persons work together. This tacit-tacit sharing is recognized and acknowledged here. However, it is important to mention that it is only possible to share tacit knowledge because acting is a way of providing information (see Boisot, 2002; pp. 67-8). In

this way, people teach each other tacitly by working together, but they do not share tacit knowledge; they share the information created through the process of acting.

Because knowledge is individual and in many cases tacit, knowledge should be studied in a *particular context* (Whitaker, 1998; Mårtensson, 2000). It is important, therefore, to be aware of the surroundings influencing the knowledge a specific person creates and uses. As such, knowledge cannot be considered in isolation. For this reason cultural practices are important in understanding knowledge and furthering the knowledge management approach. Culture, without going into too much detail, is understood here as a set of routines and behaviors that certain groups share. The culture will determine the context in which both knowledge and information will be created, transferred and shared.

### ***Knowledge content***

A third distinction commonly referred to in the literature, both in knowledge management and in epistemology, relates to the content of knowledge. O'Connor and Carr (1982, p. 61) maintain that there are two widely accepted types of knowledge: know-what and know-how, the first referring to "knowing that a proposition is true" and the second to knowing how to do something. Shute (1996), on the other hand, refers to declarative knowledge and procedural knowledge. Declarative knowledge corresponds to know-what and it is "knowledge *about* something", while procedural knowledge refers to "knowledge of *how to do* something" (Shute, 1996, p. 3323, emphasis in original). Wiig (1993, p. 12) refers to four conceptual levels of knowledge: idealistic knowledge, systematic knowledge, pragmatic knowledge and automatic knowledge. The first two correspond to declarative knowledge and the last two correspond to know-how. Quinn *et al.* (1998) maintain that there are four levels of professional knowledge held by employees: (1) cognitive knowledge (corresponding to know-what), (2) advanced skills (know-how), (3) system understanding (know-why) and (4) self-motivated creativity. The OECD (2000), in its monograph on knowledge management, adds knowing-who. These different types of knowledge are briefly explained below.

### **Know-what**

Know-what refers to the knowledge of something: knowing a date, a phone number or a name. The OECD maintains that this type of knowledge is "what is usually called information" (OECD, 2000, p. 14). As it is defined here, know-what cannot be identified as information; information is external to the individual, while know-what is within the individual. Know-what can be divided into factual knowledge and conceptual knowledge. Factual knowledge refers to the knowledge of dates, names or specific events. Conceptual knowledge refers to the knowledge of concepts, such as the knowledge of what a mammal is. In this way, conceptual knowledge has a higher level of abstraction than factual knowledge does. To a certain degree, there is a correspondence between conceptual knowledge and information as well as between factual knowledge and data. Factual knowledge could be considered the data of the brain, the bricks that form the mind. Conceptual knowledge, however, is formed of organized facts to which certain meanings have been added. Pozo (2003) has pointed out that factual knowledge is important in order to be able to build certain kinds of expertise or to create a theory.

In the so-called knowledge society, gaining factual knowledge is relatively easy: dates, names and facts are available on the Internet, in books, on the television, etc. Knowledge management must be designed to channel and control the information flow in order to increase the efficiency of information processing, which will in turn increase the efficiency of creating useful knowledge.

### **Know-why**

Know-why has been defined by the OECD (2000, p. 14) as knowledge "about principles and laws of motion in nature, in the human mind and in society". It refers therefore to the explanation of realities, in other words, theories. The term theory is used here to "refer to a complex, relational framework, which includes explanations of phenomena, and not necessarily to a well-informed scientific theory" (Vosniadou, 1996, p. 3153). As has been shown, these theories are in many instances tacit. Further, know-why will likely guide our behavior. Know-why thus refers mainly to the schema in Piaget's terms.

This theory or schema serves as a framework in which to place the facts and concepts. Studies of novices and experts have shown that the types of theories that individuals hold differ not only quantitatively, in the number of facts or concepts (what could be called the richness of the theory), but also qualitatively, in how the different concepts are organized. Thus, facts and concepts can be at the core or at the periphery of the theory, depending on how central they are to the explanation. Studies of experts and novices have shown that experts solve problems guided by these theories-in-use based on their extensive experience. Know-how is therefore related to know-why.

### **Know-how**

In recent years, especially in management literature, know-how has received a lot of attention. Sveiby (1997) refers to it as the key to the “new organizational wealth”. It has also been called procedural knowledge; it refers to the knowledge of how to do something. As in the case of know-what, two levels of abstraction can be defined: know-how can be divided into techniques and strategies. Techniques refer to ways of doing things in a specific context, such as the technique of the “drive” in tennis. Through practice, techniques become automatic and they are executed with no, or very little, participation on the part of the conscious mind. Shulte (1996, p. 3323) has referred to this know-how as skills that might be cognitive, motor or social. Strategies, however, refer to a higher level of abstraction. They are also ways of doing things, but imply a broader scope. Strategies might become automatic, but no strategic action can be taken without a certain consciousness of the situation and the problem. In this sense, strategic knowledge implies that at some level (either explicit or implicit) there is a certain amount of know-why since the strategic action is based on the schema we put into use.

Knowing-how is usually acquired through experience, or as Senge (1990), borrowing from Dewey’s work, puts it: “learning by doing”. It is by doing that our technical skills and our strategic know-how improve. Through experimentation and trial and error we create a theory-in-action that has different degrees of explicitness, but in most cases is, in fact, totally impossible to articulate. In order to promote know-how, therefore, it is important to have some opportunity for experimentation and self-learning. But further, a certain level of reflective thinking must always follow any action since it is thus that theories can be evaluated and improved. It is also important to note that these theories-in-action are attached to the context in which they are used; they are, in most cases, context-specific.

### **Know-who**

Finally, the OECD (2000) refers to another type of knowledge: know-who. Although this type of knowledge is little discussed in traditional epistemological theories, for knowledge management it is a crucial type of knowledge in terms of content. It refers to knowing who possesses certain kinds of knowledge or expertise. Know-who implies knowing who is an expert in a specific subject and being able to consult her/him if necessary for help in a specific area.

Know-who is therefore related to the social relationships that a person has. As such, these relationships allow the person to engage in a learning process with others. Face-to-face interactions will provide richer information than reading organizational documents or memos. Knowing-who is therefore connected with the idea of networking, of being part of a group and knowing the members of that group. In knowledge management literature, these groups have been referred to as communities of practice (CoP). Lesser and Stork (2001, p. 831) define CoP as: “a group whose members regularly engage in sharing and learning, based on their common interests”. This group does not necessarily include only people within the organization, but may also include customers and competitors as well as other relevant people outside the organization (see also Plaskoff, 2003).

## **3 Knowledge, action and learning**

The different terms and differentiations that knowledge management literature has provided in the conceptualization of knowledge have been presented. Knowledge is in people’s heads, it differs from information or data, it is individual, and in some instances it can be made public or shared as information. In addition, the difference between various types of knowledge has been explained in terms of content. Andriessen (2006, p. 97) identifies six different metaphors in his analysis of the

treatment of knowledge in key publications of the knowledge management field: knowledge as something physical, as a wave, as a living organism, as thought and feelings, as a process and as a structure.

In the present work, knowledge is understood both as the structure and the content of the mental schemas. Therefore, this study could be said to use knowledge as “something physical” and “as a structure” as defined by Andriessen. It also includes the idea of knowledge as feelings since the schemas have important emotional components. Further, it includes knowledge as a process, as a wave and as a living organism, since these three elements refer to the idea that knowledge is in a constant dialectic process with the reality it represents. The frame and the content are reinforced or change in each action that we perform. It is through action that we test our schema in the real world. This action will inform us about the schema that in turn will or will not change. In this way, action develops our knowledge, and knowledge is therefore a *dynamic entity*. Knowledge as a static entity never changes. The positivistic view of science maintains that scientific inquiry looks for objective and universal knowledge, what traditionally has been called Truth with a capital T. However, post-positivistic views criticize the idea of a universal truth and propose the existence of different truths. Thus there will not be a unique, invariant knowledge but different types of knowledge viewed from different perspectives.

In the management literature, as Demarest (1997, p. 375) has pointed out, interest is focused on commercial knowledge, as in the following:

The goal of commercial knowledge is not truth, but effective performance: not ‘what is right’ but ‘what works’ or even ‘what works better’ where better is defined in competitive and financial contexts.

In a similar vein, Spender (2002, p. 151) has indicated that:

We need to keep a careful eye on the utility of theorizing [about knowledge], whether our conclusions can ever be reattached to our discipline’s established empirical work in economics, strategy, competition, institutionalized theorizing, management and so forth.

The dynamic feature of knowledge is thus related to the idea that knowledge must be translated into and associated with action (Blacker, 1995; Hunt, 2003; Elkjaer, 2003). Further, the action uses knowledge but does not “consume” the knowledge that can be re-used in its modified form. Thus it is important to mention that “knowledge is *not* ‘consumed’ in a process, it sometimes increases through use” (Wiig et al. 1997, p. 16, emphasis added; Halal, 1998, p. 13). Through this process of adaptation, or equilibrium in Piaget’s terms, knowledge, action and learning are closely linked together.

To conclude, it is important to note that knowledge is related to learning. The act of learning provides knowledge and understanding, which in turn feed further learning”. As has been already argued, learning can be regarded as the adaptation of mental structures to the specific realities that an individual confronts. Knowledge, understood both as content and as schema, will therefore be constructed during this process of adaptation through its interaction with the environment. When we are presented with data (facts, impressions), we will examine that specific information (which has some meaning and structure for us) with the knowledge that we already have. In fact, the previous knowledge will guide the type of data that we seek, or beyond that, the information we seek and are capable of understanding. If that specific information content (either know-what, why, how or who) appears in adequate conditions of motivation, interest and attention, the content will be “absorbed” into the mental model (or theory) that we are applying to that specific context. The new content might not produce much change in the structure of the mental model (*alpha* answer), it might produce partial modification (*beta* answer) or it might result in a critical modification (*gamma* answer, significant learning or conceptual change). These changes in our schema constitute, in fact, learning. Figure 3 shows that learning is the process of transforming data into knowledge, making something public (information) into something private (knowledge).

The process of transforming knowledge into data is the process of teaching, understood broadly. The information that starts the process of learning is usually the articulation of someone’s knowledge that served to codify and externalize her/his knowledge. If the students (or any listener or reader) incorporate the data that has been externalized, then there is learning.

Finally, it is important to mention that knowledge might be acquired through different means. Knowledge is not only created through theoretical means (such as reading or analyzing information); learning also occurs by doing. Thus when we act, our acts “teach” us, providing us with information on our performance. This process of learning is not necessarily a conscious one, and can occur implicitly without the individual realizing it; in this way we acquire tacit knowledge.

To sum up, this paper on the conceptualization of knowledge considers learning and knowledge to be totally interrelated, since learning is the process of creating knowledge and knowledge guides the process of learning. Learning occurs constantly and throughout the entire life span, this is it is a lifelong, life-wide process.

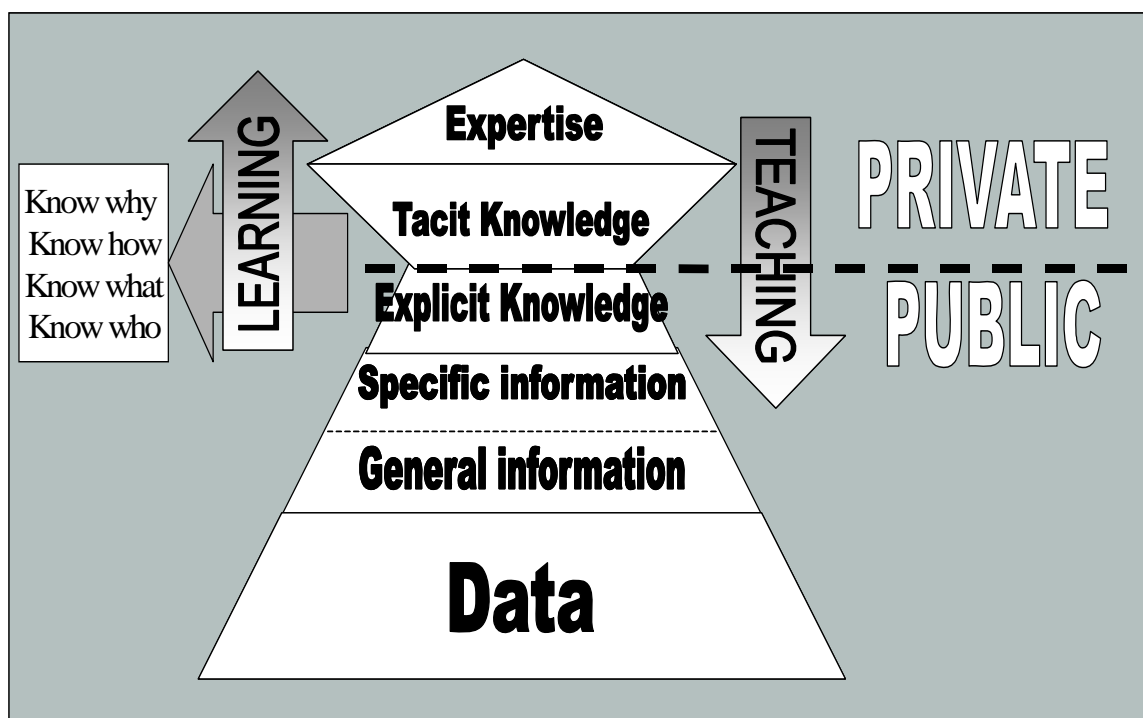


Figure 3: The conceptualization of knowledge (Villalba, 2006)

#### 4 Conclusions

It is clear that knowledge and learning are complex concepts that are difficult to define. The above discussion tries to clarify them and present some relationships between knowledge and other related constructs, but it cannot be seen as a comprehensive review of the conceptualization of knowledge.

The paper has presented the differentiation between knowledge and other related terms such as information, data or expertise. In addition, the distinction tacit vs. explicit is crucial in order to make the right decision when managing knowledge. Depending on the knowledge necessary for the specific activity of the company, some knowledge will have to be emphasized. Tacit knowledge is crucial for Small and Medium Enterprises that rely heavily on the knowledge of their employees and that do not usually have very formalized systems for knowledge management. On the other hand, bigger companies might have more formalized knowledge management systems, and might not need to rely as much on the tacit knowledge of their employees, but on information.

Thus, in terms of the promotion of innovation, understanding the nature of knowledge and its differences with other related terms is crucial in order to make right decisions in a highly competitive knowledge economy. This also calls for understanding the process of learning and as a consequence the process of teaching. If learning is meant to occur as a lifelong, life-wide process, teaching and learning are necessarily interconnected outside formal institutions. Pedagogical principals might be of interest for the business community in order to make their workforce more adaptable and able to learn.

Constructivist approaches to learning are now impregnating the business circles, but are far from being integrated into business practices.

In a similar way, school education has to become more permeable to the needs of the surrounding society and learn from business practices in terms of the management of their human resources. Teachers are usually high educated professionals that are (to some extent) “selling” know-how to students, just as a consultants are selling know-how to their clients. Collaborative working environments and sharing of best practices, as well as the use of knowledge management systems adapted to the specificities of schools might be an important step for schools to become more “knowledge-intensive”.

Finally, with the increasing importance of tacit knowledge for delivering high quality services, explicit, formalized knowledge might be necessary only partially and for specific sectors of production. In this sense, learning to learn and interpersonal skills will become as important as traditional curricular subjects (e.g. science, mathematics). A vast majority of jobs will depend heavily on being able to understand the interrelation between tacit and explicit knowledge.



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Abstract

With the emergence of the so-called knowledge economy, knowledge has become one of the most fashionable terms in the political and managerial sphere. The present paper presents different views on knowledge, focusing mainly on the literature derived from management studies. The main focus is on knowledge management approaches, since this field of study has been very much involved in relating knowledge to managerial practices.

Three main approaches to epistemology are proposed in a broad sense: innatist/introspection, empiricism/behaviourism and critical philosophy/constructivism. Special emphasis is placed on constructivism since it is argued that it is the predominant view nowadays. Afterwards, knowledge is conceptualized from a managerial perspective. More specifically, the paper differentiates between several knowledge-related terms, such as data, information or expertise. The distinction between tacit and explicit knowledge is also addressed. The paper finalizes summarizing main characteristics of knowledge and its relationship with learning.

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