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## **Transforming and Computerizing Professional Artifacts**

An underestimated opportunity for learning

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### **Abstract**

Improving the artifacts a knowledge worker uses and how he or she exercises his or her knowledge is a desire that is part of being professional, especially since we are supposed to live in a knowledge society. In the knowledge society there is a continuous structuring and re-structuring, construction and re-construction and learning and re-learning going on due to implementing new information and communication technology. But many of these so called IT-projects fail in spite of management spending huge amounts of money on them. This paper focuses on and wants to create an awareness of how an artifact such as a new knowledge management system becomes a driving force behind expanding the knowledge of an anesthetist and has implications for continuous learning among a group of employees at the anesthesia and intensive care clinic. In addition to this, implementing new technology is an underestimated opportunity for learning. This paper suggests that a significant educational effort is taking place in society channelled through many these IT-projects, even when they fail.

**Keywords:** professional artifacts; learning; knowledge management system; knowledge management; the knowledge society.

## **Introduction**

The purpose of writing this paper is to focus on the learning and re-learning that takes place among the employees at two different hospitals in connection with implementing a new knowledge management system. The perspective taken here is that we live in what has been called the knowledge society (Lane, 1966, Bell, 1974, Böhme, Stehr, 1986, Drucker, 1993, Castells, 1996, OECD, 1996). OECD has used the expression “the knowledge-based economies” instead of “the knowledge society” and characterized them as “those which are directly based on the production, distribution and use of knowledge and information”. One important difference between the two expressions “the information society” and “the knowledge society” is that the first one is characterized by low-cost information and a general use of information and communication technology while the key factor in the second is mainly investments in people, utilizing new information and communication technology. But many of these IT-projects fail and huge sums of money are supposedly wasted, especially within health care. In the knowledge society there is a continuous structuring and re-structuring, learning and re-learning and construction and re-construction of knowledge and ideas going on due to implementing new information-and communication technology. Earlier this research has focused on how knowledge is structured and re-structured and how the interpretative schemes of people are transformed when implementing new technology into their everyday work life. This paper directs itself towards management and wants to create an awareness of the learning perspective and the opportunities it creates. It wants to create an awareness of that implementing new technology is an underestimated opportunity for learning. In the section that follows is the theoretical framework presented. Then a section about interpretative case study research and a description of the empirical site comes. This paper ends with implications of implementing a knowledge management system and a discussion about the findings.

## **Professionals and professional artifacts**

All professionals live in a world of objects. This world is socially constructed in that the meanings given to these objects are fabricated through a process of social interaction. Different groups develop different worlds and these worlds change as the objects that compose them change in meaning. Blumer (1969/1998) writes that in a human group the life and action of people involved change in line with the changes taking place in their world of objects. In this case a knowledge management system implemented at the anesthesia and intensive care unit of a hospital is conceptualized as a professional artifact constructed and used during social interaction. Professional artifacts represent a corporate or organizational culture (Schein, 1992, 1999). In the artifact there are traces of action and they exist as concrete elements in the social structure. The professional get used to how the artifacts looks and it is first when they are changed that he or she starts reflecting over why and how the artifacts are used.

Carr-Saunders and Wilson (1933) have described the professionals as a phenomenon that once aroused to meet specific needs in society: a priest saves a soul, a lawyer his client and a medical doctor hopefully cures the patient. According to Larson (1979) professionalism consists of a cognitive, a normative and an organizational part. The cognitive part includes specialist knowledge and long training, the normative part ethical standards and a commitment to provide a service for the public good. Then a professional is normally also regulated by an organizational body with disciplinary powers that support these cognitive and

normative elements. Professional and specialist knowledge is a matter of both formal education based on scientific knowledge and skills (Abbott,1988). A professional has the same education as others in the same field but there are better and less good professionals. The difference lies in their capacity to learn from their experience, and of acquiring “tacit” knowledge. Tacit knowledge consists, among other things, of search rules, or heuristics, that identify the problem that is in focus for the professional and the elements consisting of the solution (Polanyi, 1966). The knowledge management system, explored in this study, is an artifact “an object produced or shaped by human workmanship”. To work with the knowledge management system has to do with fulfilling demands and being without it results in problems like guessing, having to keep things in your head and a risk of documenting too optimistic numbers. A physician cannot be sure to make the “*correct*” decision. Work becomes more of a handicraft than a profession depending on “*the doctors temperament*”, according to one of the physicians interviewed during the research process.

## **Knowledge management and learning**

Theories about organizational learning used to focus on people and human resource management while knowledge management is supposed to be something more. It is supposed to improve “factors that lead to superior performance: organizational creativity, operational effectiveness, and quality of products and services” (Wiig, 1993). Knowledge management can also be defined as a phenomenon that “turns an unreflective practice into a reflective one by elucidating the rules guiding the activities” (Tsoukas and Vladimirou, 2001).

In real-life situations the practice of managing knowledge may consist of intra-organizational and/or inter-organizational activities. When mobilizing internal knowledge, information processes are managed to promote the sharing of information, conversion of tacit knowledge, experimenting and prototyping and the migration of knowledge to other parts of the organization. The transfer of knowledge from an individual to a group level might for example occur through the development of a unique language or a code which allows group members to learn who knows what and to coordinate their activities. But before this is possible one has to investigate and make visible what kind of knowledge that exists and this can be done through knowledge-audits organized by the management. There are three critical factors that concerns knowledge integration: shared experiences, shared symbolism captured in metaphors and logos and shared artifacts. Then the effectiveness of integration mechanisms depends on the existence of a common knowledge and other forms of symbolic communication, the commonality of specialized knowledge, shared meaning and the recognition of individual knowledge domains.

The creation of new knowledge is often stimulated by a situation that identifies gaps in the existing knowledge of the organization. Such gaps stand in the way of solving a technical or task-related problem, designing a new product or service, or taking advantage of an opportunity. Choo (1998) uses a general metaphor for knowledge creation that is “looking across many levels”. It means that new knowledge is created by sharing and shifting knowledge across many organizational levels, including individuals, groups and other organizations. Knowledge creation can be achieved through recognizing the synergistic relationship between tacit and explicit knowledge and through the design of social processes that create new knowledge by converting tacit knowledge into explicit knowledge.

As an example, Leonard Barton (1995) suggest following knowledge building activities: shared problem solving, experimenting and prototyping, implementing and integrating new

processes and tools and importing knowledge from outside. When it comes to the last activity he distinguishes between external knowledge that is technical in nature and knowledge about the market. The key to importing technological knowledge is for the organization to expand its absorptive capacity by scanning broadly and continuously for technical opportunity and by identifying employees who can act as technological gatekeepers. Knowledge about the market might generate new products. This might be a challenge when the technological potential outstrips the users ability to understand it. During the activity of shared problem solving employees with different specializations and problem-solving approaches are brought together so that the diversity of their knowledge and back-ground can be channelled toward creative problem solving. As people become highly skilled they develop individual “signature skill”, which are formed from their specialization, cognitive style preferences, and preferences for particular tools or methods. Bringing people with diverse signature skills together to work on a problem generates a situation that can be fertile for innovations. When integrating and implementing new methods and tools is proprietary knowledge introduced into process tools and methods that improve internal operation. To ensure successful implementation user involvement is essential since the future users of the tool will have critical information that must be integrated during design. Through the activity of experimenting and prototyping an organization extends its existing capabilities as well as build new capabilities for the future. In situations like this ”intelligent failures” provide valuable lessons.

Knowledge-linking (Badaracco, 1991) between organizations is another and interesting way to work to acquire new knowledge. Knowledge-links are defined by four traits. First the central objective of knowledge links is learning and creating knowledge. This may be contrasted with product links, where the main goal is to provide access to a new product or open up to wider distribution of an existing product. Second, knowledge links are more intimate compared to product links since relations between people have a stake in what happens. Third, knowledge links can be established with a wide range of partners. It does not have to be within the same industry. Fourth, knowledge links have a greater strategic potential than product links.

Knowledge links can extend or enhance an organizations basic capability whereas product links tend to be more tactical allowing the organization to catch up or defend its position. In knowledge linking the organization forms intimate learning alliances with other organizations in order to transfer knowledge that is embedded in the specialized relationships, work cultures and operating styles of the partner organization. The goal is to enhance the knowledge-density of the networks. Now the creation of knowledge is no longer the activity of an organization working in isolation, but the collaborative result of its members working closely in internal groups and in partnership with other organizations. But the migration of knowledge between organizations continues to pose many challenges. A significant amount of knowledge is still being transacted in the form of specific pieces of equipment, software, blueprints, documents and the like. Such prefabricated knowledge tends to have short life spans and is often exchanged for operational or tactical reasons. Inter-organizational collaborations depend on the alliance or the governance structure of the agreement between the partners. Equity joint ventures will lead to a higher degree of knowledge sharing than contract-based alliances. Then the internal capabilities, nature of knowledge, collaborative strategy, bargaining powers, management processes and network structure of the partners influences the outcome of knowledge linking (Badaracco, 1991).

A “technology” can be physical objects or artifacts, activities or processes, what people know or what they do; one example is the “know-how” that goes into operating a device in the

operating room (Bijker, Hughes and Pinch, 2001). Implementing technology right into a knowledge workers daily life influences established patterns of action. Tools like for example computerized patient records might confuse employees, alter social relations and manipulate with cognitive abilities. They might even change the ease of solving a problem (Norman, 1993). Inspired by structuration theory (Giddens 1979; Giddens 1984) and social constructionism (Berger & Luckmann, 1966) technologies can be seen as human artifacts, produced and reproduced through human action, which both constrain and enable human action. In this paper an information system is a system that consists of at least one person, who faces a problem within some organizational context, for which he or she needs some information to arrive at a solution, and that information is made available to her through some mode of presentation (Boaden and Lockett, 1999). This mode of presentation is often some sort of information or communication technology. A knowledge management system involves taking one step further. It is an information system designed specifically to facilitate codification, collection, integration and dissemination of organizational knowledge (Alavi & Leidner, 1999). A typical knowledge management system involves a data base, a cataloguing system, version control, document access control, a user-friendly search and navigation capability, and a possible variety of advanced features such as e-mail notification or commenting. In general a knowledge management system is developed to enhance the efficiency of a work process. It is supposed to facilitate codification, collection, integration and dissemination of organizational knowledge. Also it can correct mental biases and avoid features such as fatigue among employees that limit decision-making. In addition to this a knowledge management system is a possibility to elaborate on strategies for how to use information in connection with learning more efficiently in networks.

## **Interpretative Case Study Research**

This is an interpretative study using two cases. Case studies into practical knowledge can be pictured as studies in particular localities or efforts to elicit the impact of a certain particular environment and the problems it presents on a phenomenon researched (Janik, 1996). In this case implications of constructing and implementing a knowledge management system have been explored at one hospital in Austria and one in Sweden. Data has been collected using interviews and observation. Most effects of implementing a KMS have been registered in Austria since they have had this kind of system the longest. The clinic, that treats very sick heart patients, employ 32 nurses, 15 physicians, 5 technicians and 3 information technicians. The physicians and the nurses work both as anesthesia and intensive care personnel. The clinic has its own local laboratory, a pharmacy, a local blood-bank, its own server and 15-16 computers. A decision about buying and implementing a new information system was taken by the two chief anesthesists of the clinic. *"We visited St George in London and L'Hopital St Lazare in Paris before deciding on what system to chose"*, says M. H., professor in anesthesia and head of the clinic. Then they bought and implemented two applications, Chart Plus and Visual Care. During surgery Chart Plus registers data such as pulse and blood-pressure while Visual Care registers therapies, how they are performed and the outcome of them.

The hospital in Sweden is constructing a new patient record on paper. At the main anesthesia- and intensive care unit work around 95 doctors and 140 nurses, totally about 280 people. December 21, 1998 a Specification of Requirements for a computerized anesthesia and intensive care patient record was produced. The project starts in the beginning of 1999 because of new legislation produced by The Swedish National Board of Health and Welfare about what should be included in an anesthesia patient record and a wish at the clinic to computerize and transform the patient record into a knowledge management system.

A project-group of four persons is constituted during the fall of 1999. The project-group is going to answer following questions:” What is it that we do? What is it that we would like to document, that is not done today? How are we going to document so that it is possible to follow the course of an anesthesia? ” They start by making an inquiry among the employees at the clinic about what they think should be documented in a new patient record. In December 2 000 they send a upgraded patient record to be printed. The new patient record on paper is tried out May 21 by anesthesists and anesthesia nurses. In august 2001 Many changes in the project-group take place. One person is taking a leave, another is leaving for good. The new project-group has a meeting at the beginning of the fall the same year. It is difficult for employees to take time off from daily work to work with the new patient record on paper. But after listening to reactions from employees some final changes are done in the paper document. A new patient record on paper is printed and arrives at the end of March 2002. It will be tried out at the clinic during a long period. *“We are satisfied with the changes done but realize that this is the kind of work that will never stop. All the time it is possible to make improvements in reference to what the employees at the clinic needs”*, explains the project-leader.

One way to start interpreting a phenomenon, as in this case, is to look for and compare similarities and differences. “Interpretation is the work of thought which consists in deciphering the hidden meaning in the apparent meaning...” (Ricoeur, 1974). The goal as an interpretative reseacher is to investigate, make visible and interpret how others make sense of and interpret what happens to them in their every-day world. People say something but what do they really say? People do things but what do they really do? A researcher is also supposed to interpret texts that he or she has produced after the interviews: “What has to be interpreted in a text is what it says and what it speaks about, i.e. the kind of world which it opens up or discloses” (Ricoeur,1978/1997).

Interpretation becomes possible when we realize that there are several ways to see things. The way we have been taught to see situations is not the only way. Another way to start interpreting a phenomenon is to search for an analogy or a metaphor that enhances the interpretation. When the project-leader describes the project of constructing a new patient record on paper as:” ...this is like squeezing all of the bible into one page...” the word “bible” offered a perspective on how to think about the project.

Interpretative researchers normally conduct research using ethnographic or thick descriptions of the world. In ethnographic research the researcher spends at least a year at the research site, close to what he or she studies. Thick description gives the context of an act, states the intentions and meanings that organize the action, traces the evolution and development of the act and presents the action as a text that can be interpreted (Geertz, 1973/2000). A thin description simply reports facts, independent of the circumstances, that surround the action while a thick description goes beyond fact to detail, context, emotion, and web of affiliation and micro-power (Denzin, 1983). The goal here has been to give a descriptive account that is so well grounded in observational and interview data that it is possible to understand “what is going on here” and analyze “how things work” (Wolcott, 1994).

A problem in interpretative research is the temptation to reach far beyond the case itself in speculating about its meaning or implications. Wolcott (1994) advises new researchers that it is better to err on the side of too much description than too little interpretation. The anthropologist Clifford Geertz thinks that a good interpretation of anything-a poem, a person,

a history, a ritual, an institution or a society-takes us into the heart of that of which is the interpretation. "What we call our data is really our own constructions of other peoples constructions of what they and their compatriots are up to" (Geertz, 1973).

In an interpretative study truth depends on the perspective taken. One final truth does not exist. Sandberg (1995) writes that achieving truth within the interpretative research tradition is an ongoing and open process of knowledge claims correcting each other. Inspired by Sandberg (1994) this research has applied "communicative and pragmatic validity" and "reliability as interpretative awareness" to the findings in this study. Communicative validity involves establishing an ongoing dialogue in which conflicting knowledge claims are debated throughout the research process. Pragmatic validity involves testing the knowledge produced in action. According to Sandberg (2000) striving for pragmatic validity increases the likelihood of capturing knowledge in action rather than "espoused theories" about what is going on. The concept, "reliability as interpretative awareness", means that a researcher cannot escape from his or her interpretation but must deal with them throughout the research process. In this research systematic reflection has been used to achieve interpretative awareness. It means that the researcher goes through all interviews from the beginning, reflecting over what people have said and letting ideas about the material mature during several phases.

## **At the Empirical Site**

An anesthetist is conceptualized as a knowledge worker, since he or she accesses data, uses information, employs mental models and applies significant concentration and attention when exercising his or her knowledge. In addition to this anesthesia is based on scientific improvements and continuous learning. The anesthesia and intensive care clinic at a hospital is in general organized into peri-operative, operative and intensive care. The patient is evaluated at the peri-operative care unit, before being anesthetized and exposed to surgery in the operative care unit. After surgery the patient wakes up in the intensive care unit where pain management takes place. During surgery an anesthetist records something called vital signs which is the degree of oxygen in the blood, the heart frequency, medication and the degree of awakesness and pain. He or she is required to rapidly interpret and respond to a large number of clinical parameters, while selecting appropriate treatment for the patient among many different options. Work in the OR is characterized by intense patient care and *"requires a keen awareness of what is happening to the patient and what is happening in the OR. You need to be aware of what everybody else is trying to do and understand why they do what they do"*, explains one of the anesthetists.

The data that is recorded in the OR must be absolutely reliable and retrievable. It is "mission critical", which means that the anesthetist cannot go back and get this data later, he or she must get this data as it is being derived. According to legislation a physician must have generated a document at the end of the surgery with this data. The people around the operating table have to make decisions under conditions that may not always be suited to accuracy or thoroughness. They face uncertainty and complexity, when trying to understand what the problems are, identify alternatives for how to act and appraise possible outcomes of their actions. *"You need to be flexible, understanding and accommodating to do this kind of work. At the same time it takes an aggressive person to do OR work, otherwise you wont get the work done"*.

New knowledge is created, in this very specific organizational setting, by managing conversations, mobilizing knowledge activities and globalizing local knowledge (Von Krogh, Ichijo and Nonaka, 2000). A younger anesthetist learns from an older at the anesthesia reception desk and in the OR through discussing cases. Discussing cases is also done during many of the meetings at the clinic. Then sense-making takes place as they agree on how to diagnose and act. Scientific and educational efforts are also integrated into work since most of the physicians are involved in different types of research projects at the same time as they perform their daily work.

## **Implications for learning of Constructing, Implementing and using a Knowledge Management System**

One of the first things one realizes, when interpreting and reflecting over the data, is that constructing and implementing a knowledge management system involves learning both for the anesthetists and the nurses. *"I have had to learn a lot"*, says one of the nurses in Austria and one of the anesthetists say: *"I teach new physicians the soft ware. If you do not know about computers it is difficult at first. It takes about a month to learn"* and *"When a physician is alone it may be a problem if she or he is supposed to search for trends in the data. New physicians make mistakes and we must change and correct what they have done"*. Another thing that happens when constructing a knowledge management system is that employees involved start reflecting over how, what and why they do what they do. Transforming the artifact they use creates an "awareness" among the employees concerned. The project-leader at the Swedish hospital also describes the project of constructing a knowledge management system like this: *"This project is not only about producing a new knowledge management system, it is about finding out what we do and why we do it"*. It can therefore be seen as a knowledge management project in the sense that it makes visible and elicits the core in a practice. It "turn an unreflective practice into a reflective one by elucidating the rules guiding the activities" (Tsoukas and Vladimirov, 2001). It is also a knowledge management project in the sense that it strengthens an identity and further develops a language for a unique group of people. A strong identity is believed to improve coordination, communication and learning in a professional group (Kogut and Zander, 1996). To keep your identity as an anesthetist means to continue to build on earlier knowledge. Anesthesia could stagnate as a specialist domain without learning and scientific improvements. And research, education and learning are possible with a new knowledge management system.

According to the project leader the project is like *"trying to squeeze the Bible into one page"*. It is a problem to agree on how much information to include in a knowledge management system since the anesthetists at the clinic are involved in many different types of activities from multi-trauma to ear-surgery and pain management. It is also a problem that nurses and doctors have a different language when it comes to documenting. *"It is two different ways to look at things, two different needs. Physicians have a language, we are searching for one"*, explains the project-leader. Another problem is that earlier this specialist domain has used many different words to express the same thing. *"We have been writing the same thing in many different ways. We have not had such a solid common base as maybe other professions have but we are beginning to get it. Today we have common search-words that we must use when constructing a new patient record. Now we have a common vocabulary and that unites us"*, says the project-leader. Searching for a common language and/or an identity is vital when working with knowledge management in an organizational setting or a project since it influences and improves integration mechanisms. This is also what happens in this project.

Before anesthesia employees used different words for the same thing, now they have decided to use words that everybody agrees on and can be found in a database created by the national health authorities.

An organization learns by constructing, testing and restructuring its theories of action. By computerizing the charting process, physicians and nurses could have comprehensive, easily accessible data and be able to devote more time to patient care and process improvement. The need to access the knowledge management system is described like this: *“It can be interesting to go back and see how the patient was put to sleep earlier, what happened then, if there were any complications, how much anesthetic did this person need, and so on. It can be useful for us. But often this information does not exist. It has disappeared, been lost, or someone thought that the anesthesia patient journal we can through away, or they forget it at the ward, they forget to send it with the rest of the papers...”* (interview with one anesthetist)

Both constructing a new knowledge management system on paper and computerizing one nurtures activities such as experimenting, prototyping and implementing of new processes and methods that is supposed to improve internal operations and how knowledge is exercised. In this case the employees in the project group share experiences, they share a metaphor “the bible”, they share the knowledge management system. It is an artifact but also a representation of the course of an anesthesia. When buying the soft-ware the two physicians in Austria also decided on “quality”. *“We wanted the best!”* In this way they express a professional desire to be upgraded and have the latest and the best.

Surgery and anesthesia used to be mostly “hands on activities” performed by surgeons and anesthetists using hands and eyes when doing what they do. Now the content of anesthesia work gets more and more involved with analyzing and documenting, learning and improving how knowledge is exercised. Also computerized documentation makes it possible to go back and study the course of an anesthesia each minute especially if there was a problem. In Austria the employees also look at the knowledge management system as a tool to “explore data”. In this way an expansion of organizational capabilities is possible. At the Austrian clinic one of the project-leaders says: *“We wanted automatic data sampling, an overview over what happened with the patient, longer trends, fluid balances and ordination of drugs, in the system”*. He continues: *“We also wanted to use it in intensive care in connection with ordering drugs, we wanted a structure for planning inventions and a task planning feature. Not only registering vital signs like in anesthesia”*. When they implemented the soft-ware they decided on not having a project-leader. *“We learn from each other”*.

## **Discussion**

Often stories about the many failed IT-projects within health care take mythical proportions and billions of dollar, pounds or crowns are supposedly spent in vain. The main contribution of this paper is to questions if some of these so called failed projects are failed in the long run and suggest that a big educational project is going on in society due to implementing new information and communication technology. Almost all of these projects initiate learning, education and create new knowledge, even when they fail. This paper wants to make management aware of the opportunities for learning that appear in connection with upgrading and computerizing documents, such as patient records. It is a period of learning and re-learning in which management might introduce new ideas and new strategies. It is a period that might be supervised and influenced more actively by management than what is often done today. Often management is so focused on the implications on a micro-level of the new

knowledge management system that they forget about all the re-learning that it also involves. This research shows that re-constructing a key-document such as a patient record is an opportunity to discuss what employees do and what they are supposed to do. It is also an opportunity to discuss what takes place at work and what is supposed to take place. It gives management an opportunity to actively monitor the organizational setting surrounding the document and the employees. But it seems that the opportunities a project like this gives for re-innovation and re-thinking work-processes and tools in an organization is rarely taken advantage of by management.

## References

- Abbott, A. (1988) "Systems of Professions". Chicago: University of Chicago Press
- Alavi, M. (1999) : Knowledge Management and Knowledge Management Systems. Journal of AIS, vol.1,no.1
- Alavi, M.& Leidner, D.E. (1999) Knowledge management systems: Issues, challenges and benefits. Communication of the Association for Information systems, 1:1-28
- Badaracco, J. L. (1991) The Knowledge Link:How Firms Compete through Strategic Alliances. Boston, MA:Harvard Business School Press
- Barton L Lipman (1995) "Information processing and Bounded Rationality: A Survey". Canadian Journal of Economics. Canadian Economics Ass. Vol. 28 ( 1 ), pages 42-67
- Bell, D. (1974) The Coming of Post-Industrial Society: A Venture in Social Forecasting. Heinemann. London
- Berger, P. L. and Luckmann, T. (1966):"The social construction of reality", Doubleday, New York, N.Y
- Beuscart-Zephir, M.C (2001) Integrating users activity modeling in the design and assessment of hospital electronic patient records: the example of anesthesia. International Journal of Medical Informatics. Dec 2001, vol.64, no.2, p.157-171 (15)
- Bijker, W.E. Hughes, T.P., Pinch, T. (1987/2001) *The Social Construction of Technological Systems*. The MIT Press.
- Blumer, H (1969 / 1998) Symbolic Interactionism. University of California Press
- Boaden, R and G.Locket (1991) "Information technology, information systems, information management:definition and development". European Journal of Information Systems 1 (1) :23-32
- Böhme, G., Stehr, N. (1986) "The knowledge Society. The Growing Impact of Scientific Knowledge on Social Relations".D. Reidel Publishing Company
- Carr-Saunders, A.M. and Wilson, P.A. (1933) "The Professions". Oxford at the Clarendon Press. Oxford University Press
- Choo, C.W. (1998) "The Knowing Organization :How Organizations Use Information to Construct Meaning, Create Knowledge, and Make Decisions". Oxford University Press. New York
- David, P. A. and Foray, D. (2002) "Economic Fundamentals of the Knowledge Society" in Policy Futures in Education-An e-Journal. Jan 2003
- Denzin, N. (1983) *Interpretive Interactionism. Beyond Method*. (Ed Morgan, G.) Sage Publishing.
- Dervin, B. (1992) From the Mind's Eye of the "User": The Sense-Making Qualitative-Quantitative Methodology. In Qualitative Research in Information Management, eds J. D. Glazier and R. R. Powell. Englewood, CO: Libraries Unlimited.
- Essin D.J, et al. "Development and assessment of a computer-based pre-anesthetic patient evaluation system for obstretical anesthesia. J Clin Monit Comput 1998 Feb;14(2):95-100
- Geertz, C. (1973/2000) *The Interpretation of Cultures*. Basic Books, New York.

- Georgopoulos, B.S., Mann, F.C.(1962) *The Community General Hospital*. The Macmillan Company. New York.
- Giddens, A. (1991) *Modernity and Self-Identity*. Polity Press, Cambridge.
- Giddens, A. (1984) *The Constitution of Society*. Cambridge, UK:Polity Press.
- Giddens, A. (1979) *Central problems in social theory: Action, structure and contradiction in social analysis*. London:Macmillan.
- Janik, A. (1996) "The Concept of Knowledge in Practical Philosophy". Brutus Östlings förlag
- Junger A.,et al. (2002) An Anesthesia Information Management System as a tool for controlling resource management of operating rooms. *Methods inf Med* 2002; 21 ( 1 ):81-5
- Kogut, B. and Zander, U. (1996) "What Firms Do? Coordination, Identity, and Learning". *Organization Science*, Vol 7, Issue 5 (Sept-Oct ), 502-518.
- Lane, R. E. The Decline of Politics and Ideology in a Knowledgeable Society *American Sociological Review*, Vol 31, issue 5 ( Oct., 1966 ), 649-662
- Larson, M.S. (1977) "The Rise of Professionalism: A Sociological Analysis". University of California Press, Berkely
- Mead, G. H. (1934 / 1967) "Mind, Self, and Society." The University of Chicago Press
- Nonaka, I. (1994) A dynamic theory of organizational knowledge creation. *Organization Science*, 5,1:14-37
- Nonaka, I., and Takeuchi, H. (1995) *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation*. Oxford University Press, New York.
- Norman, D. (1993) *Things that make us smart*. Perseus Books, Cambridge, Massachusetts.
- OECD: *The Knowledge Based Economy*, OECD/GD, 1996
- OECD: *Employment and growth in the Knowledge-Based Economy*, 1996
- Polanyi, M. (1966) "The Tacit Dimension". London, UK:Routledge & Kegan Paul
- Polanyi, M. (1969) *Personal knowledge*. Chicago:University of Chicago Press.
- Ricoeur, P. (1974) *The Conflict of Interpretations*. Northwestern University Press. Evanston.
- Ricoeur, P. (1978/1997) *The Rule of Metaphor. Multi-disciplinary studies of the creation of meaning in language*. Routledge, London.
- Sandberg, J. (1994) *Human Competence at Work. An interpretative approach*. Bas,Göteborg.
- Sandberg, J. (1995) *How do we justify knowledge produced by interpretative approaches*. EFI Research Report. ISBN NR 91-7258-400-9.
- Sandberg, J. (2000) "Understanding human competence at work. An interpretative approach". *Academy of Management Journal*, vol.43, pp.9-25.
- Schein E. H. (1992) *Organizational culture and leadership*, Jossey-Bass INC, San Fransisco
- Schein E. H. (1999) *The corporate culture-survival guide*, Jossey-Bass INC, San Fransisco
- Schein, E. H. (1984)"Coming to a New Awareness of Organizational Culture. *Sloan Management Review* 25 (4), p.3-16
- Stehr, N. (1994) "The Knowledge Society". Sage Publications.
- Taylor, R. (1991) *Information Use Environments*. In *Progress in Communication Science*, ed B. Dervin and M.J. Voigt. Norwood, NJ:Ablex Publishing Corporation.
- Tsoukas, H.and E.Vladimirou, "What is organizational knowledge". *Journal of Management Studies*. 38:7 , 973-993. November 2001
- von Krogh,G., Ichijo,K., Nonaka, I., (2000) *Enabling Knowledge Creation. How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation*. Oxford University Press
- Wiig, K. (1993) "Knowledge Management Foundations-Thinking about Thinking-How People and Organizations Create, Represent and Use Knowledge", Arlington, TX: Schema press
- Wilson, T. D. (1997) *Information Behaviour: An Interdisciplinary Perspective*. Information

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Wolcott, H.F. (1994) *Transforming qualitative data*. Thousand Oaks, CA:Sage.