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APPLYING QUALITATIVE RESEARCH IN E-LEARNING: DISCUSSION AND FINDINGS FROM THREE CASE STUDIES

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Abstract

The case of learning in the era of digital economy is a fascinating phenomenon. The complexity of learning integrated with the diversification of new technologies set a dynamic landscape where the performance seems to be the overall objective of combined efforts. Our approach tries to investigate the phenomenon from a "myopic" point of view. The starting point of our research effort is the acceptance for the existence of a direct relation that brings together learning, new technologies, pedagogy and knowledge management. In this paper we present the initial findings from the application of qualitative research methodology. More specifically we discuss three case studies (multiple case strategy) concerning e-learning systems implementation and we discuss the way that knowledge management theory can support in practical ways the performance of e-learning systems.

Introduction

A common practice in academic institutions or business units is the employment of new learning technologies in order to support the human resources management. In most of cases the adoption of several Learning Management Systems, provides a context for exploitation but unfortunately the achieved learning performance is rather inadequate (Lytras and Pouloudi 2001) (Lytras and Pouloudi 2001), (Lytras, Pouloudi et al. 2002). The enormous efforts that have to be paid in order to develop e-courses have risen a critical questioning on whether the invested money and the employed human capital are utilized.

After the critical reviewing of e-learning literature and the analysis of several cases presented on conferences and described in journal articles, we decide to put the emphasis of our research on parameters that could provide empowerment in e-learning. Additionally the participation of our research team called ELTRUN (http://www.eltrun.aueb.gr) in Athens University of Economics and Business in projects concerning Knowledge Management gave as a hint that these two areas could be integrated. Several conflicting opinions about the convergence of knowledge management and e-learning realized a dialectic context of reasoning and justification (Allee 2000), (Hodgins 2000), (Hong and Kuo 1999), (John Garrick 2000), (K. -D. Altho, F. Bomarius et al. 2000).

The fact that knowledge management concentrates on knowledge processes and knowledge artifacts (Mentzas, Apostolou et al. 2001) promoted the initial step in our approach. The underlying logic is extremely clear. If in an e-learning environment we can justify several knowledge processes that construct a kind of knowledge artifact that is finally diffused to learners then information technology can analyze the technical standards and the required applications for the support of our conceptualization.

The knowledge exploitation in modern era is recognized as a critical phenomenon. Several approaches (Kim, Mauborgne et al. 1997), (Allee 1999) reveal the potential capacity of knowledge to empower the capacity for effective action. The development of dynamic learning environments requires a systematic justification of methods and processes that vary learning (unique value proposition) for every learner. In this direction a number e-learning techniques (Ruttenberg, Spickler et al. 2000), (Bryans and

Smith 2000) seem to be a common approach with uncertain performance (Lytras and Pouloudi 2001a), (Lytras and Pouloudi 2001b), (Lytras and Doukidis 2000). This challenging situation sets a context that promotes the research in reusability of knowledge resources. A realization of reusability can be based on semantics that enrich general knowledge resources (e.g. an article, a journal paper, a PowerPoint presentation, etc.). The ultimate objective is to expand the customisation capabilities of learning environments and knowledge management seem to be a well justified mean for the achievement of such a goal (Lytras and Pouloudi 2001), (Lytras, Pouloudi et al. 2002).

Research Methodology

The initial scepticism for the relation that integrates knowledge management and e-learning forced a very focused literature review of knowledge management approaches. The two basic approaches of Knowledge Management according to Mentzas (Mentzas, Apostolou et al. 2001), are:

• The knowledge processes approach where a number of well defined more or less distinct but integrated processes describe the knowledge activities that realize the continuum of tasks that require an extensive cognitive motivation.

• The knowledge artifact approach where the phenomenon of knowledge management is focused on the constructions of knowledge as a building block for further exploitation.

This distinction of approaches doesn 't seem to be exclusive in the meaning that the first approach doesn't cancel the effect of the second. Especially in the case of learning there is evidence that a number of processes formulate the learning context and also that a kind of learning product is transferred and exploited. So our analysis investigates modes of integration. In this manner our knowledge management orientation tries to set a framework where a descriptive knowledge management life cycle model provides a value adding step-based approach for the construction of learning objects.

In last years, the case of e-learning or distance learning, seems to gain significant importance in Information Technology scientific community and the same stands for the knowledge management. Many tracks in conferences, special issues in journals and well known scientific journals provide the thoughts and the research findings of efforts. The selection of an appropriate research methodology in order to investigate a phenomenon is of critical importance.

In the general literature of research methodologies in information systems (Myers 1997), (Strauss and Corbin 1990), (Lee and Fielding 1991), (Archer 1988), (Denzin and Lincoln 1994), (Bogdan and Biklen 1982; Guba and Lincoln 1994), (Eisenhardt 1989), (Yin 1994), (Orlikowski and Baroudi 1991), (Walsham 1995)we can found many approaches which in general can be placed among the qualitative or in the quantitative research methodology.

The qualitative research is contradistinguished with quantitative research, as these two fundamental research methods are positioned in the extreme edges of a continuum. An interesting definition provided by (Strauss and Corbin 1990) claims that the qualitative research is *'"any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification"*. According to information provided by Michael D. Myers (Myers 1997) the qualitative research is using qualitative data, which are collected using techniques that range from interviews, observational techniques such as participant observation and fieldwork, through to archival research. Written data sources can include published and unpublished documents, company reports, memos, letters, reports, email messages, faxes, newspaper articles and so forth.

In relation to education and learning, where its social character is an integral feature of the phenomenon, a qualitative research seems to be more suitable as the learning performance is less quantitative and more observed in qualitative characteristics that can be revealed through interpretation of behavior and change of perceptions. (Hoepfl 1997).

Miles & Huberman (Miles and Huberman 1994) described qualitative research as simply, research based upon words, rather than numbers. Denzin & Lincoln (Denzin and Lincoln 1998) provide a more generalized definition for qualitative research "Qualitative research is multimethod in focus, involving an interpretive, naturalistic approach to its subject matter". This definition implies that qualitative researchers study things in their natural environment and understand events in terms of the meaning people assign to them. This perspective provides a clear direction to our research since we decide to study three implementations of e-learning systems that have been analysed, designed and implemented for real world situations.

Benbasat et al (1987) also found similar benefits of qualitative research and listed them as: (1) the researcher can study information systems in a natural setting, learn about the state of the art, and generate theories from practice; (2) the method allows the researcher to understand the nature and complexity of the process taking place; (3) valuable insights can be gained into new topics emerging in the rapidly changing information systems field. The case of e-learning is very interesting to be studied on its natural environment even though the numbers of actors that are engaged are multiple. But the qualitative techniques permit the researcher to investigate the complexity of the phenomenon. E-learning is usually treated as a simulation of methods used in traditional education, and this habit limits the creative use of information technology. The complex nature of e-learning and the multidisciplinary influences that force new considerations for effectiveness and performance set a challenging research agenda.

The work of Hoepfl, summarizes the basic characteristics of qualitative research that are pointed out in research works of several researchers such as (Bogdan and Biklen 1982), (Lincoln and Guba 1985), (Patton 1990), (Eisner 1991). According to (Patton 1990), (p. 55), qualitative research uses the natural space as the data source that is interpreted later on. The researcher is trying to observe and to describe the situation under a specific attitude that Patton described it as «empathic neutrality».

On the other hand, there are also disadvantages associated with this type of research, which include the fact that qualitative data is usually predominantly textual, with a richness that can be lost when aggregation or summarisation occurs. The data can be fairly unstructured and unbounded as it concerns people' s behavior and attempting to understand their perception of a particular situation. (Lee and Fielding 1991) Lee (1991) also identified the disadvantages of qualitative analysis as "a lack of- controllability, deductibility, repeatability and generalisability". Even though the several disadvantages that were described the qualitative research was chosen in our research, and the specific technique that we used included the interpretivism. The research strategy focused on multiple case study method.

One of the most important research objectives in our research is the clarification of the empowerment that knowledge management provides the codification of knowledge objects, for their use in an e-learning environment as learning objects. The other aspect of this objective is the specification of modes that provide the packaging of knowledge objects to learning scenarios capable of providing dynamic mechanisms for the diffusion of learning content. In the direction to justify codification and packaging techniques for learning content there is a two-fold context. From the one side the supply side where we have enormous requirements to aggregate content and knowledge and from the other side the demand side where learners demand flexible and customized mechanisms to interact with the technology supported learning environment. The learning performance and the effectiveness, especially in the case of adults learning seems to be more a subjective phenomenon rather than objective. In other words if we try to conclude propositions using quantitative methods is rather inadequate to explore deeper findings, since the complexity of learning requires investigation of behavioral aspects, which are not quantitative in nature.

Moreover the analysis of our research problem and the justification of our research methodology can be supported by the concepts, which Klein & Myers (Klein and Myers 1999) proposed. The hermeneutic cycle and its basic emphasis on the complementarities of a phenomenon and its component promote the basic idea that a phenomenon such as e-learning has to be analyzed through the distinction and the integration of the various variables that effect the whole system. In our approach distance learning and especially e-learning is treated as a phenomenon where technology, knowledge management and pedagogy intersect in order to promote higher cumulative value. In this triptych each part demands special analysis and promotes an integrated support to the so-called distance learning.

This researcher' s preconception that knowledge management is a critical pillar of e-learning performance set the basis for further analysis. Consequently according to qualitative research techniques we had to find qualitative data exploiting a number of people opinions. For this reason we set a context of analysis by selecting three case studies which referred to implementation of e-learning systems. In this way the proposed historical context that is required according to Klein & Myers principles is evident.

Phenomena in science are not determined univocally and according to the concept of ontology the way to gain knowledge about the phenomenon has to be contextual. The variables that already mentioned, namely, the technology, the knowledge management and the pedagogy intuitively promote the objectives of e-learning. From this point of view in the whole research picture we add one more parameter: The way in which the codification of knowledge and learning content increases the reusability of learning content, and how this reusability is realized through learning objects with embedded learning value. The concept of metadata (Duval 2001), (Brasethvik 1998), (Farance 1999), data about data, according to a simple definition, is not a modern fad. It is as old as the people decide to organize and catalogue resources in order to secure their reusability. A knowledge resource is transformed to a learning object through the attachment of specific metadata that have to be specified.

The research methodology of our approach is presented in figure 2. It describes very synoptically the phases of our work, in order to achieve our overall research goal: To provide a knowledge management perspective to e-learning implementations, and ultimately to set technological standards in XML for the description of learning content that can be promoted through dynamic learning scenarios and not hierarchical organization of learning content.
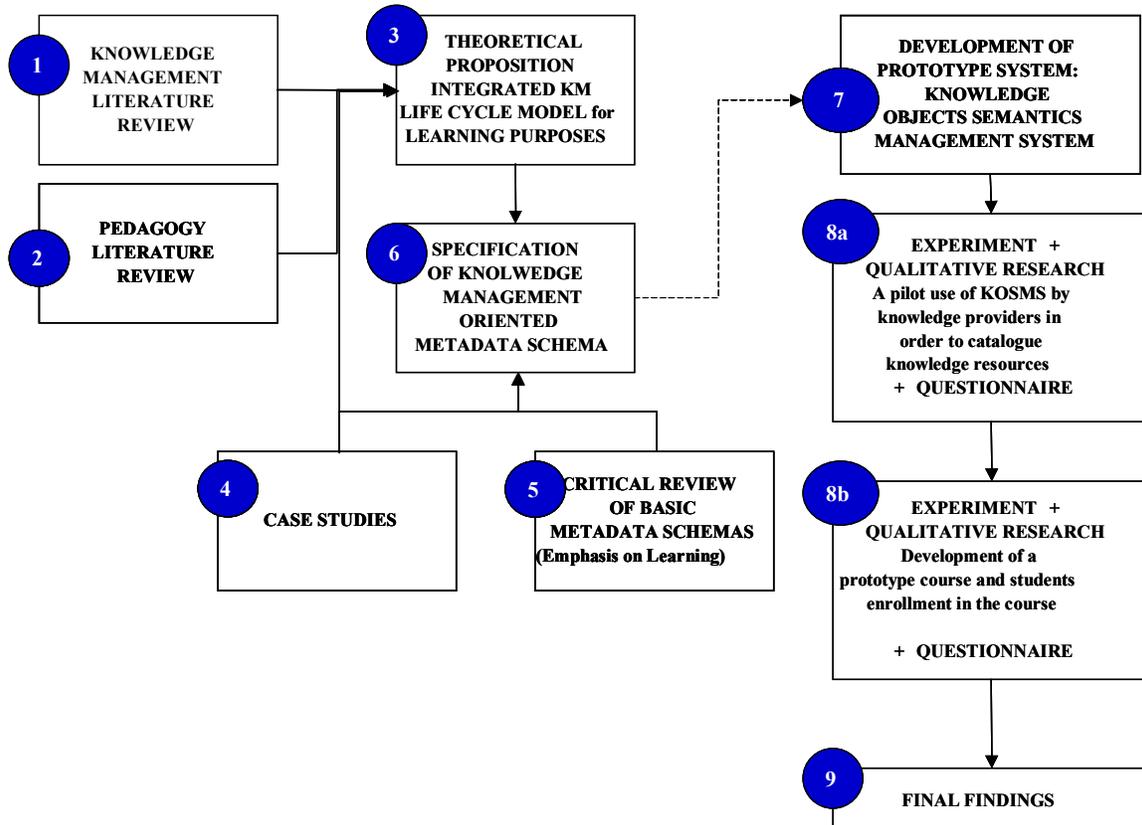
Figure 1. The Research Path

Discussion of Cases

Selection of Cases

The proposition of theoretical directions for the case of e-learning and knowledge management convergence can be justified if empirical evidence can support conceptualizations that are not only descriptive but also incorporate and substantial practical implications. For this general purpose three case studies were studied thoroughly pursuing a two-fold goal:

1. First of all recording of empirical evidence that can base further abstractions (e.g. theory building) or validate conceptual models

2. Secondly, integration of interpretations that provides the description of the phenomenon not indirectly but directly from attitudes, opinions and behavior of actors in e-learning implementations.

The selection of case studies in our research requires a systematic reasoning. The context of our research, the postgraduate training and the development of flexible infrastructures for knowledge diffusion in academic environments require multifold contributions in order to achieve the research objectives. In other words, even though the case study research method is not a sampling technique, the representative nature and the quality of the case studies that were selected among many alternatives was decided according to the following criteria:

1. The case study has to refer in implementations of e-learning systems, and especially web based asynchronous training.

2. The system that case study describe, should be used either in pilot run in the context of a funded project or / and after the end of pilot run, so that it would be possible the discovery of drawbacks and characteristics that impede the e-learning performance.

3. The e-learning system should diffuse knowledge to learners so it could be discovered the formal or informal knowledge management (hidden) process.

4. The operation of the e-learning system should present the capability of the system to reuse learning content through metadata or any other approach of data enrichment.

5. The case study should provide information concerning the way that the information resources were selected and finally packaged to a learning object.

The case studies in our research are:

(1). The Global E-management Master e-learning system and especially the development of the T1 course entitled E-technology, which was delivered to the student of the GEM consortium,

(2). The XEXO project (Educational space without limits), which objective was to establish an e-learning system and to deliver a master degree course to the students of three universities in Greece

(3). The Teleducation Center of Athens University of Economics and Business which utilizes the WebCT platform in order to provide learning content to students.

The three cases used in our analysis were documented using several techniques. The main process for getting input in our research was by taking interviews. About 20 interviews were conducted and recorded in order to provide the initial data for analysis. Additionally a number of documents were analyzed including technical reports, deliverables, memos, e-mails and discussions. Finally a number of informal discussions contributed to our research.

Interviews are favoured because they allow the researcher the "best access to the interpretations that the participants have regarding the actions and events which have or are taking place, and the views and aspirations of themselves and other participants" (Walsham, 1995). An added benefit is that it allows researchers to step back and examine the interpretations of their fellow participants in some detail.

The overall objective of these interviews were to formulate the whole picture for the problems that e-learning implementations face as well as the typical or untypical knowledge management process that used in order to develop learning content. The intensive review of knowledge management frameworks (Binney 2001), (Despres 1999), (Hahn and Subramani 2000), (Heldund and Nonaka 1993), (Jay Liebowitz and Suen 2000), (Leonard-Barton 1995), (Lytras and Pouloudi 2001), (Lytras, Pouloudi et al. 2002), (McAdam and McCreedy 1999), (Mentzas, Apostolou et al. 2001), (Nissen, Kamel et al. 2000), (Stonehouse and Pemberton 1999), could summarized in a revised knowledge management life cycle model that could be used as a descriptive framework for the explanation of the knowledge management phenomenon.

Our research questions were mapped in an intensive questionnaire, which supported our survey agenda. Our focus was concentrated on several key issues that were raised from the literature review:

• The hidden knowledge management process that were employed in order to transform the selected information resources to learning objects

• The type of implementations concerning capabilities for customization of learning content to specific needs or different type of learners

• The packaging mechanism that realized the basic learning scenario to learners.

• The enrichment of information resources with metadata for the improvement of their management

- The potential capacity to reuse learning content in revisions of courses

- The problems encountered and the alternative strategies that could improve the performance of implementations.

The data analysis of the rich text data was based on qualitative data analysis according to the basic guidelines of interpretivism. The main concession of interpretivism according to (Walsham 1995) is that interpretive researchers do not claim to the reader of their study that describe facts. Instead they collocate interpretations of people that participate in real facts. This means that the analysis of empirical evidence has from the beginning to be clear that is based on interpretations and not on absolute representation of reality

The Scope of Case Studies

The ELTRUN, e-Business Center, a knowledge intensive research Unit in Athens University of Economics and Business directed by Prof. Georgios J. Doukidis, has been involved in many Greek and European funded projects (in IST program). Our participation in this research unit gave as an extraordinary opportunity in the selection of case studies for the research objectives. Several projects concerning e-learning implementations, or e-learning courses gave as the opportunity to select typical implementation of e-learning systems.

The three case studies that finally selected were comprehensive and fulfilled the prerequisites that were described earlier. Additionally they presented a gradation of implementation: The Teleducation Center of Athens University of Economics and Business, one of the biggest and well-organized universities in Greece with more than 8000 students and 3000 postgraduate students refers to the implementation of an infrastructure for the delivery of e-courses, and the documentation of relevant services to educators and learners. The e-learning system of Global E-commerce Masters, and especially the development of a course, provided expertise from a wide range international e-learning implementation targeting on executives training with specific characteristics. Finally the e-learning system of XEXO project (Educational Space without Limits) was a joint effort of three well-known universities in Greece to design a common curriculum and to establish an infrastructure for e-learning.

One positive feature of the three implementations irrelevant of the short history of their existence was the commitment of the involved partners to ensure the longevity of the operation and the management structures of e-learning systems. This fact provided a guarantee that the observed problems during the operation of e-learning systems would create a substantial questioning and debate for the finding of ways that would improve the e-learning services.

Especially in the case Global E-Management Masters the longitudinal orientation of the consortium was realized and through the periodical revision of e-courses in terms of content and functionalities through the experimentation and the constructive utilization of expertise. The high quality standards of the GEM and the increased demand for registration in GEM, force the inspirators of the program to find flexible ways for the delivery of learning content to executives. This context originated a challenge for the e-learning system.

The integrated analysis of the findings in the three cases intended to reveal and to evaluate using theoretical models the formal or informal knowledge management mechanism. The special character of the three cases, namely the educational orientation, imply that the "success" of the implementation would be based on attitudes of learners – users of such systems. Moreover, the fact that three implementations referred to implementations from scratch it was very interesting to investigate and commit to paper the integrated life cycle model that describes the transformation of information elements to organized learning content. The key subject of research was the "modeling" of the knowledge flow from the initial selection until the on-line diffusion of learning content.

In every case it was clear from the beginning of the analysis that the viability of the systems would depend on their ability to manage effectively learning content and to support effective processes for content reuse. The enormous efforts needed for the development of content was investigated immediately as well as the inflexible and static diffusion of learning content. Another interesting aspect of the interviewing strategy was the specification of the e-learning strategy in each case. The use of an e-learning platform had to be evaluated on the basis of its capacity to support the basic learning scenario, if such scenario was clear defined. In this complex context of deliberate nesses, one more parameter needed a special handle. The way of learning content packaging and the diffusion mode of learning content had to be analyzed

In the next section we will provide a synopsis of the findings in the three cases using some tables. The limited space of this paper doesn't allow a more detailed quotation of findings.

Validation of the KM Model for e-Learning

In figure 2 is presented a descriptive knowledge management framework, which summarizes an extensive research work concerning e-learning ad knowledge management convergence (Lytras, Pouloudi et al. 2002), (Lytras and Pouloudi 2001).
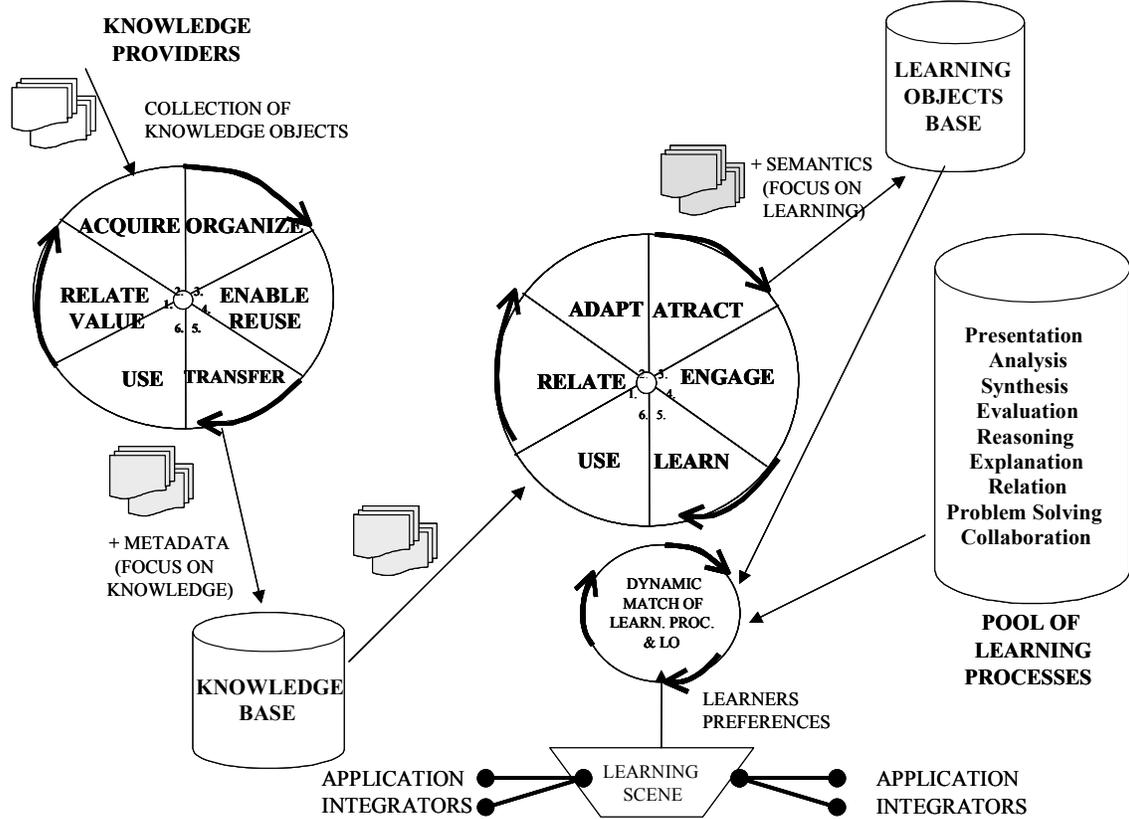
Figure 1. The Integrated Knowledge Management Descriptive Model for e-Learning Purposes

The proposed knowledge management descriptive model is setting a context that can be useful in e-learning implementations. The validation of the model requires empirical evidence and through the integration of theory and empirical evidence we are seeking to build trust on the underlying practical implications. For this reason in the following section we try to present data analysis of the selected data in three case studies. The presentation begins with a structured description of findings concerning variables that play an important direct or indirect role to our model and finally a tabular synopsis is provided in order to discuss the variation from theoretical propositions and empirical evidence.

Basic Parameters of Analysis

Knowledge Management Orientation
Management of Learning Content:
The development of learning content is not an easy task. Several parameters make this process an intensive, cognitive, difficult and unfortunately with unclear performance task. Several opinions of the interviewees describe the complexity of the phenomenon. If we sum up the various contributions then we can understand that there is usually learning content development which requires enormous efforts in order to fulfill learning needs, to motivate learners, to enhance collaboration, to solve problems and to support meaningful learning experiences.

Mr. Ev. , claimed that special effort is only the visible aspect of the phenomenon. He valued more the need to define a process for the content development or to "confront the phenomenon as a process with tasks and actors. The basic observed problem in e-learning implementations is the fact that the knowledge providers or the authors, usually they are influenced by the existing management technology which is the technology of document management and rather not electronically organized. For this reason they give book – based learning content, which limits the potential usefulness of information technology.

Mr. Ts. Stated that e-learners preconceptions affect their attitude in e-learning: "The critical point of success in e-learning is the fact that learners have to handle learning material in a way different than the traditional preconceptions of what means learning (lecture based approach). A way to overcome this shock is to develop a learning context similar to the traditional one, using information and communication technologies in a creative way that can realize the real world learning delivery model. But this realization requires excessive effort in comparison to the traditional efforts that are needed to support class-based courses". Mr K. said that e-learning content development is not a technological issue, as it is supposed to be by various people who believe that if they buy an e-learning platform then everything will work in the direction of achievement of educational goals: "The development of an e-learning system is a creative task, since you don't have only to consider the technological dimension of implementation, but you have to analyze a number of cognitive and pedagogical oriented parameters, e.g. the learners profile, their learning absorption capability and the diversification of personal and cultural characteristics"

Mr. Sp, put emphasis on audience characteristics: "Each time you must have in mind the target group - the audience so that their needs will be fulfilled by the whole implementation. Of course the motivation is a nice word but it is hardly achieved in e-learning". According to Mrs A. the development, the management and the delivery of learning content through e-learning "requires especial effort, and this is justified if we reach the phenomenon from the point of view that you have to enter in the position of learners as well as to be the knowledge provider. This means to be a learner as well a teacher".

Mr Giov, revealed the importance of organizing the learning content: "The effort for the realization of e-learning is enormous and special since the organization of such a system as well as the coordination of the participated people in the development process, in many cases of e-learning is something brand new, there are no experiences gained from the operation of previous systems".

Mr Frag, said "the specific the main discreteness of the e-learning phenomenon is the fact that the content has to take a special format since usually there is not a direct interaction between educator and learner, and this causes incremental effort for the prediction of problems that can arise. The answer to this situation is the extensive design of structure and format of learning content".

Mrs Samara claimed that the development of e-learning content is a hard work, which requires effort and time "it requires enormous effort and time, especially time. The familiarization with the development process and the session's orientation of material made the development of content just a matter of time. The development of multimedia feature, especially at the beginning when we had to experiment we spend much time and effort".

Selection of Information Resources for Learning Content Development:
In all cases a critical issue was the selection of information resources that would be used for the development of learning content. Two approaches have been used in general. 1). There was a hypothesis concerning the cognitive level of learners that all treated in the same manner and 2). There was a kind of informal learners need analysis that supported the definition of general content requirements.

Organization of Knowledge in E-Learning Implementations & Metadata Usage:
The major observed problem in three implementations was the weak organization of learning content in such a way that could secure the effective management of the resources. The e-courses were developed using static HTML approach and the packaging mechanism required the uploading of these pages to well-known e-learning platform such as WebCT and Blackboard. Only in a few cases there was a systematic concern to enrich information resources or learning content with metadata.

The metadata for general purposes or the learning objects metadata was not used in any case. This was stated as a critical deficiency of implementations since due to this reason the reusability of the learning content was limited. More over the absence of annotation mechanisms to learning content limited the search capabilities of learners to explore the learning content, as they would probably like.

Life Cycle Model for the Transition of Information to Learning Content:
The development of learning content in most of the cases was a joint effort where a number of people were involved in several phases. According to the interviews several similar approaches were employed: According to Mr. L. "In the first stage we have to study and to determine the objectives and the functional specifications of the educational system. The structure and the development of learning content follows, intending to be the basic management infrastructure of the e-learning system. In parallel the design of the interface is of critical importance. The development of the learning content requires enormous effort for the distinction of learning objects, where the knowledge provider has to break down the material in functional learning modules".

According to Mrs A., the development life cycle of the learning content "begins with the selection and storage of information sources, the isolation of critical parts that characterized suitable to support learning content, the adoption in order to match the general didactical approach, the enrichment with explanatory information and finally the diffusion to learners".

According to Mr Ts. "after the relation to the specific needs of the learners, some information sources were selected. The transformation process was mainly focused on the downsizing to functional learning units, and additionally there was a systematic effort to integrate the meaning of learning unit with pre-existing experiences of the learners since the experience recall during the learning phase is of critical importance".

An interesting approach provided by Mr. K. "The whole of GEM, set a number of requirements and meta-requirements, for the implementation of an X effective mechanism. If we try to simplify the whole development life cycle then we have to say that in the beginning there is the recognition of the educational problem. This includes the learners' goals, the course objectives, which are directly related to the students' profile, their background, and the whole curriculum objective. After that, follows the design of the packaging mechanism for the learning content, which was a combination of information resources selection (papers, presentation, reports, interviews with professors) and storage. A difficult task was the aggregation of the various information resources to meaningful units and the development of the learning content as such. This life cycle is integrated by a phase, which penetrates the whole cycle with emphasis to be pain on how we decide the specific packaging of content, the format of the content, the technological platform for the diffusion and the functional interface. Finally debugging, pilot run, and evaluation of the operated e-learning system".

Mr. Ev., stated an interesting approach concerning transformation life cycle. As he claimed, " in the beginning is the specification of the notional content, which refers to the ability of meaning to match with a specific learning environment. Secondly, we have to characterize the content's educational value, using several indices, which means if the content is suitable for memorization, or evaluation and cognitive exploitation -this is a teacher task-. In other words this tasks is a learning classification for its suitability to perform learning processes. In the third phase there is the development of content, through the incorporation of several information resources into meaningful structural pieces. This task probably requires additional design and changes to the initial information resources (adoption). Finally we have the diffusion of the learning content using the e-learning platform. A problem that I have observed but I haven' t find a solution is the enrichment of this content semantically, so that its reusability could be increased"

According to Mr Kan, " a systematic critical review of available information resources drives the decision to select the parts that could be useful for the educational goals".

Reusability Capacity:
As it was stated earlier the concept of reusability has to be analyzed using a common understanding. Many e-learning specialists consider the reusability as the capability to use a portion of the structure of an e-learning course to another course. In no sense the reusability in three cases was considered concerning learning objects. The learning unit in the three approaches was the session which was the minimum meaningful unit of the system.

Pedagogical Issues
E-Learning Pedagogy:
The three cases converge concerning their pedagogical strategy since there was a rather unclear pedagogical scenario. The effort was mainly paid to the development of content without systematic analysis of what means to be a learner through Internet. In the interview part where the interviewees were asked to criticize the utilization of information and communication technologies they stressed the limited utilization of ICT's.

Basic Learning Scenario:
The basic learning scenario was the sequential browsing of several sessions that include case studies, presentation, linked documents and several exercises. The active participation of learners was limited and it was stated that usually the students instead to browse the learning content they preferred to print the material. This phenomenon was one of the most characteristic deficiencies of the e-learning systems.

Dynamic Character, Customization of Content Personalization:
The employed learning scenario caused a number of undesired effects. First of all the packaging of learning content was static which meant that all learners had to interact with the same interface and had to follow the same phases in order to fulfill their learning needs. The educational scene couldn't be customized to specific needs.

Learning Objects Ingredients:
Mrs. An, stated that in e-learning environments it 's not only the knowledge diffused but information technology supports the realization of other valuable characteristics such as "the collaboration of learners, the motivation that engages them to the learning scenario, the way that the learning content is packaged and presented, the extend in which attracts the learners". Mr. Zah, from XEXO case study provided a similar opinion, claiming, " The online collaboration is of critical importance. Additionally the ensuring of collaborative and synergetic development of learning content. The active participation of learners to develop their own content or to propose preferred learning modules"

Mr. K, stated that "the knowledge, the mode of presentation and the examination of learners cognitive status. This means that the information system that supports e-learning has to be able to check the degree of knowledge absorption of learners, in a way that secures the readiness of learner to continue in the next learning module".

Mr S., recognized the importance of multimedia features in e-learning implementations even though they are time and money consuming: "I could say that in e-learning you provide knowledge with an eye catching way, so that you attract the interest of the learner for the content. If you give him text through html pages then there is no benefit since this is just like to read a book in a boring way. Information technology can do more than just providing a hierarchical structure of linked html pages".

Mr Giov, in the XEXO case study, stated that "I believe that an educational system in internet could offer capabilities for collaboration or in other words to support the so-called collaborative learning, or personalized learning, using techniques like chat and other conferencing tools. As I have ascertained in several implementation the use of chat is rather problematic due to several reasons but mainly because of the attitude of learners. Of course the technical exploitation could support more synergetic learning scenarios except for simple presentation of knowledge. For example dynamic discovery of learning content by learners as well as the customization of learning material that could be facilitated form specific processes available to learners, the communication of academics and students. Unfortunately in XEXO, we didn't support all this interesting features".

Performance
Quality Assurance:
Te case of quality assurance is a difficult task. The absence of standards that characterize the quality in learning material sets limitation to the exploitation of value within e-learning environments. More over in the three implementations was not clearly defined what would mean that the e-learning system succeeded or achieved the initial goals. This fact implies that the effect of learning is not measured in e-learning implementations mainly because the phenomenon is treated as a content diffusion method and not such a critical instrument for the enhancement of intellectual capital.

Difficulties/Problems Encountered:
The complexity of learning as a cognitive phenomenon, demands an elaborative approach, and unfortunately a number of problems are encountered in real e-learning implementations. According to Mr. Evan., "the major problem that we face is related to educators or knowledge providers. Their attitudes are realized through two distinct features due to their limited experience in e-learning: First of all they don't understand what happens after they provide the content and secondly they don't find substantial importance or significance in the effort that is needed after their involvement. This has a crucial impact especially in the cases where the educators are the people who direct the learning process. Usually academics don't pay much attention to the pedagogical aspects of learning and they don't try to utilize the learning content exploitation"

Mr. Kour, put in the dialectic one more parameter. The fact that in the market of LMS there are several applications providing scalable e-learning solutions but unfortunately technology is not panacea: "The Gem has students from many countries and this requires a multicultural confrontation. The decision to develop a unique packaging mechanism in the first edition was based on several parameters. It was obvious that there was a diversification of learners needs in different countries since executives in Greece have different needs than executives in USA, where there are more stimuli from technology. Another major problem was the limited available time. It was impossible to specify concrete requirements in three weeks time. It was clear that at least three iterations were required, accompanied by prototypes of the learning environment before the final approval was achieved"

According to Mr. Sp. "the main problems are related to understanding and cooperation issues. The overstepping of deadlines caused in several moments an extra pressure and stress. The limited experience in e-learning that was evident in many people of the development team stretched the problems but hopefully there were a few experts that were undertaking the effort to overcome the deficiencies.

Mr. Lyb stressed the importance of monetary assessment in e-learning developments: "I think that two are the common problems in e-learning. From the one side you have to convince for the value, the monetary value of learning content, and especially in cases where the organizations or companies that pay for an e-learning system make a huge underestimation of required budget. This is the case when the involved people don't   realize the complexity of the development process. From the other side I have concluded that a special role is required, an agent between the development team of e-learning system and the authors of the learning content. The common practice of the authors to pay attention to develop a text-based content is inadequate because the objective of e-learning implementation is to provide more value to learners than a traditional book. This text based approach where the learning content is divided into sessions is very close to what the students have in mind when they refer to learning but this is also why they prefer to print and read in hard copy the material".

Mr. Giov treated the problems that are usually encountered in the basis if reusability: "I consider that learning content must contains such structural components that could be easily re-usable. In the majority of implementations this is not ascertained. This practice is justified because the ensuring of reusability requires more development effort, in terms of characteristics that identify the content.

Mrs. Sam., claim, "The development of the content was a routine work. There was a problem concerning the communication and the understanding of the educator, since the educator didn't have in mind what could be included in the WebCT, and how much effort was required for this".

E-Learning Concept Specification:
The answer to the question what means e-learning for you is not a simplistic abstraction of attitudes. We tried to see what are the interpretations that key people in three implementations gave to the phenomenon of e-learning. Several opinions were provided promoted the understanding of people for e-learning. The interpretation of their opinion leads an extensive understanding of their priorities concerning e-learning as well as justifies the specific role of knowledge management, information technology and pedagogy in their approaches.

Mr Kour, paid attention to the innovative character of e-learning "E-learning for me is the transformation of learning experience through new technologies. And because I know how difficult is to recognize what means experience, then e-learning has to put enormous effort on building unique experiences. This means that the core issue in e-learning is the transformation and the enhancement of learning experience".

According to Mr. Zac, "I will use the typical definition. This is also the ultimate goal for me. To enable the access to high quality learning content any time any where". According to Mr. Pap, "e-learning is not a simple simulation of traditional class-based learning, since it offers much more functionalities and benefits. But if we don't exceed the value of traditional learning in e-learning implementations then this means that we haven' t achieve the desired level of its usefulness".

Mr. Lyb, emphasizes on the role of e-learning specialists: "All the e-learning experts must become missionaries in order to communicate the importance of new technologies and to present the benefits of ICT's in e-learning more over than just publishing static content with limited learning value".

Mrs. A., claimed: "e-learning means capability to enable learning in any time that learner is willing to learn, wherever he is, through systematic guidance. The ultimate objective of the guidance must be the absorption of knowledge and not the simple observation of information or the reading of published material on the web".

Mr. Tsam, set a critical questioning concerning e-learning "…in my perception e-learning as well as many other e- things went to extremes overestimating their capacity to solve problems or to claim a panacea role in their fields. Especially in the case of e-learning the answer is to emphasize again on learning theories ant in learning processes that have prove their usefulness for years. So the conclusion is build on experience and utilize technology for constructive transformation"

Conclusions

The limited space of the article, did not allow to present the findings in detail even though that we believe that qualitative research reveals many hidden aspects of the phenomenon of e-learning which no quantitative research can do. Table 1 summarizes the investigated issues and the key findings, which seem to validate the presented KM framework.

Table 1. The Knowledge Management Perspective in Three Cases

ISSUES INVESTIGATED	CASE STUDY1	CASE STUDY 2	CASE STUDY 3
Knowledge management approach	• Recognition of the educational problem (learners' goals, the course objectives, which are directly related to the students profile, their background, and the whole curriculum objective). • Relation to the specific needs • Selection and storage of information sources, • The design of the packaging mechanism for the learning content • Isolation of critical parts (the downsizing to functional learning unit) • Aggregation of the various information resources to meaningful units and the development of the learning content as such • Adoption in order to match the general didactical approach, • Enrichment with explanatory information • Diffusion to learners • Integrate the meaning of learning unit with preexisting experiences This life cycle is integrated by a phase, which penetrates the whole cycle with emphasis to be paid on how we decide the specific packaging of content, the format of the content, the technological platform for the diffusion and the functional interface. • Finally debugging, pilot run, and evaluation of the operated e-learning system".	• The specification of the notional content • Characterize the content's educational value, using several indices (learning classification for its suitability to perform learning processes). • Structure & Development of content, through the incorporation of several information resources into meaningful structural pieces. (Requires additional design and changes) • Design of the interface is of critical importance • Study and determine the objectives and the functional specifications of the system. • The diffusion of the learning content using the e-learning platform. • Engagement of learners through learning scenarios • Evaluation	• General content specification/layout • Knowledge sources selection and evaluation • Prototype rich text learning content • Review and approval • *Downsizing to functional learning units* • Organization & Management (without Metadata in XEXO) • Adoption to WebCT capabilities

Table 2. The Problems Encountered in Three Cases

ISSUES INVESTIGATED	CASE STUDY1	CASE STUDY 2	CASE STUDY 3
Problems encountered	• Diversification of learners needs • Limited available time. • Many iterations for development of prototypes • Understanding and cooperation issues. • The overstepping of deadlines caused in several moments an extra pressure and stress. • The limited experience in e-learning	• Educators or knowledge providers limited experience in e-learning: • They don't understand what happens after they provide the content • They don't find substantial importance or significance in the effort that is needed after their involvement • Usually academics don't pay much attention to the pedagogical aspects of learning and they don't try to utilize the learning content exploitation" • Monetary assessment in e-learning developments • You have to convince for the value, the monetary value of learning content (huge underestimation of required budget from buyers of e-learning services). • A special role is required, an agent between the development team of e-learning system and the authors of the learning content. • The common practice of the authors to pay attention to develop a text-based content is inadequate because the objective of e-learning implementation is to provide more value to learners than a traditional book.	• "I consider that learning content must contains such structural components that could be easily re-usable. In the majority of implementations this is not ascertained. • This practice is justified because the ensuring of reusability requires more development effort, in terms of characteristics that identify the content. • "The development of the content was a routine work. • There was a problem concerning the communication and the understanding of the educator, since the educator didn't have in mind what could be included in the WebCT, and how much effort was required for this"

Table 3. Pedagogical Aspects and Considerations in Three Cases

ISSUES INVESTIGATED	CASE STUDY1	CASE STUDY 2	CASE STUDY 3
Learning objects ingredients	• The collaboration of learners, • The motivation that engages them to the learning scenario, • The way that the learning content is packaged and presented, • The way they attract the learners". • "The knowledge, the mode of presentation and the examination of learners cognitive status. • This means that the information system that supports e-learning has to be able to check the degree of knowledge absorption of learners.	• Mainly content not knowledge (knowledge requires semantics) • Communication • Team collaboration • Interactivity • Active Participation • Value diffusion through sophisticated services • Feedback • Personalization – Data mining according to specific needs	• " The online collaboration is of critical importance. • Additionally the ensuring of collaborative and synergetic development of learning content. • The active participation of learners to develop their own content • Multimedia features even though they are time and money consuming: • "I could say that in e-learning you provide knowledge with an eye catching way, so that you make the learner interested in the content. • ICT's can do more than just providing a hierarchical structure of linked html pages" • "I believe that e-learning could offer capabilities for collaboration or in other words to support the so-called collaborative learning, or personalized learning. • Of course the technical exploitation could support more synergetic learning scenarios except simple presentation of knowledge.
Personalization/ Dynamic nature of e-learning system	• Limited not automated • Need for metadata and a data base orientation		

Table 4 provides a very brief tabular presentation of the convergence of theoretical findings and empirical results that jointly provide some conclusions.

Table 4. Comparing the Theoretical and Empirical Evidence

Key Themes	Theoretical Findings	Empirical Results	Conclusions
E-learning content development as a constructive knowledge management process	(Mentzas, **Apostolou** et al. 2001) claim that knowledge processes is a value carrier. This theoretical abstraction utilized the propositions of other researchers (Hahn and Subramani 2000), (Nissen, Kamel et al. 2000) who provided several life cycle descriptive models for KM	All 3 cases provided information that justifies e-learning as a KM process. Specific phases usually informal provide a context for the diffusion of learning content to users. Several problems unfortunately and limited management mechanisms decrease performance	The conclusion is that the knowledge process concerning e-learning realization range to a wide spectrum that incorporates two general pillars: General knowledge management processes and process for the adoption of knowledge to learning objects.
Learning object as a knowledge artifact	(Mentzas, Apostolou et al. 2001) claim that knowledge artifact is a way for realizing the knowledge management. Several researchers (Nonaka and Takeuchi 1995), (Heldund and Nonaka 1993), (Boisot 1987) where a questioning concerning what is knowledge is provided. The justification of learning object as a knowledge artifact drive an excessive analysis	In all cases it was recognized that learning content was not knowledge in its true sense since there was an absence of metadata or semantics that would enrich the semantic density of learning material. But it was also stated that codification and diffusion is of critical importance for the learning objects. Additionally a number of other value ingredients of the learning product were described from interviewees. Their realization in e-learning settings requires more sophisticated techniques	The development of learning content requires the attachment of metadata in order to become a qualitative transformation of information to knowledge. This requires excess effort from educators. The overview of several metadata schemas (LOM, GEM, Ariadne, IEEE LOM, IMS, DC) seem to bee inadequate to support the learning dimension of e-learning
Metadata justification and e-learning pedagogy support	(Shuell, 1992) & (Bloom and Krathwohl 1984) provide a context for providing different learning value. Learning processes or learning objectives are the value drivers.	Unfortunately the learning performance of three cases was based on static learning scenarios. It was evident that this dimension of e-learning implementations was to weak and needed support.	The detailed analysis of learning processes can cause a significant contribution specifying metadata elements for specific learning processes. This secures and the dynamic nature of e-learning since its learners could get a different value selecting different learning processes.

This approach is not ending here. A systematic modeling of metadata for learning processes has already finished. A prototype of a tool called Semantics for Learning™ is already developed. This interoperates with a prototype of the Dynamic E-learning Case Builder™. We believe that very soon we will be able to launch a new platform based on the abstractions that mainly enrich information resources in order to build re-usable learning content. Our research unit (www.eltrun.aueb.gr) welcomes any comment or contribution concerning the key ideas presented in this article.

References

Allee, V. (1999). "New tools for new economy." Perspectives on Business and Global Change, World Business Academy Vol. 13(No. 4).

Allee, V. (2000). E-learning is not Knowledge Management.http://www.linezine.com/2.1/features/vaenkm.htm. Access Date:14/9/2001.

Archer, S. (1988). Qualitative research and the Epistemological Problems of the Management Disciplines, Oxford, Basil Blackwell.

Binney, D. (2001). "The knowledge management spectrum - understanding the KM landscape." Journal of Knowledge Management Vol. 5(1): pp. 33-42.

Bloom and Krathwohl (1984). Taxonomy of Educational Objectives, Handbook I: Cognitive Domain. New York, Addison-Wesley and Co.

Bogdan, R. C. and S. K. Biklen (1982). Qualitative research for education: An introduction to theory and methods, Boston: Allyn and Bacon, Inc.

Boisot (1987). Information and Organizations: The Manager as Anthropologist, Fontana/Collins, London.

Brasethvik, T. (1998). A Semantic Modeling approach to Metadata. CAGIS project, funded by the Norwegian Research Council.

Bryans, P. and R. Smith (2000). "Beyond training: reconceptualising learning at work." The Journal of Workplace Learning Vol. 12(6): pp. 228-235.

Denzin, N. K. and Y. S. Lincoln (1994). Handbook of Qualitative Research, Thousand Oaks CA, SAGE Publications.

Denzin, N. K. and Y. S. Lincoln (1998). Collecting and Interpreting Qualitative Materials. Thousand Oaks, California, SAGE Publications.

Despres, C. (1999). "Knowledge management(s)." Journal of Knowledge Management 3(2): 110-123.

Duval, E. (2001). Standardized Metadata for Education: A status Report. Word Conference on Educational Multimedia, Hypermedia and Telecommunications (ED-MEDIA 2001), June 25-30, 2001, Tampere, Finland (CD Proceedings).

Eisenhardt, K. M. (1989). "Building theories from case study research." Academy of Management Review Vol. 14(No. 4): pp. 532-550.

Eisner, E. W. (1991). The enlightened eye: Qualitative inquiry and the enhancement of eduacational practice, New York:, NY:Macmillan Publishing Company.

Farance, F. (1999). LOM Specification, Learning Objects Metadata, Proposed Draft 4, IEEE.

Guba, E. G. and Y. S. Lincoln (1994). Competing paradigms in qualitative research., In N. K. Denzin & Y. S. Lincoln (Eds.), Handbook of Qualitative Research (First ed., pp. 105-117). Thousand Oaks, CA: Sage.

Hahn, J. and M. Subramani (2000). A Framework of Knowledge Management Systems: Issues and Challenges for Theory and Practice. 21st International Conference on Information Systems (ICIS 2000), Brisbane, Australia.

Hahn, J. and M. Subramani (2000). A Framework of Knowledge Management Systems: Issues and Challenges for Theory and Practice. 21st Annual International Conference on Information Systems, ICIS 2000,, December 10-13, 2000 at the Brisbane Convention and Exhibition Centre, Brisbane, Australia.

Heldund and Nonaka (1993). Models of KM in the West and Japan. Implementing Strategic Processes Change, Learning and Cooperation. in, B. Lorence, B. Charkavarthy, Roos, J. and H. Van de Ven, Mackmillan, London: pp. 117-144.

Hodgins, W. (2000). In to the future: A vision paper, American Society for Training and Development and National Governor Association: pp: 1-60.

Hoepfl, M. (1997). "Choosing Qualitative Research: a primer for Technology Education Researchers." Journal of Technology Education Vol. 9(1).

Hong, J.-C. and C.-L. Kuo (1999). "Knowledge management in the learning organization." Leadership and Organization Development Journal Vol. 20(4): pp. 207-215.

Jay Liebowitz and C. Suen (2000). "Developing knowledge management metrics for measuring intellectual capital." Journal of Intellectual Capital 1(1): 54-67.

John Garrick, S. C. (2000). "Knowledge work and the new demands of learning." Journal of Knowledge Management 4(4): 279-286.

K.-D. Altho, F. Bomarius, et al. (2000). "Knowledge management for building learning software organizations." Information Systems Frontiers, Vol. 2(3/4): pp. 349-367.

Kim, C., R. Mauborgne, et al. (1997). "Fair process: Managing in the knowledge economy." Harvard Business Review 75(4): 65-75.

Klein, H. K. and M. D. Myers (1999). "A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems." MIS Quarterly Vol. 23(1): pp. 67-94.

Lee, R. M. and N. G. Fielding (1991). Computing for Qualitative Research: Options, Problems and Potential, in Fielding, M. G. and Lee, R.M. (ed.), Using Computers in Qualitative Research, Newbury Park CA, SAGE Publications.

Leonard-Barton, D. (1995). Wellsprings of Knowledge.Building and Sustaining the Sources of Innovation. Harvard Business School Press, Boston, MA., 1995.

Lincoln, Y. S. and E. G. Guba (1985). Naturalistic inquiry, CA:Sage Publishing, Inc.

Lytras, M. D. and G. I. Doukidis (2000). 'E-learning evaluation criticism. The Multidimensional Dynamic e-Learning Model'. The Fourth IASTED International Conference on Internet and Multimedia Systems and Applications (IMSA 2000) [CD Proceedings], ,November , 20-23, 2000, Las Vegas, Nevada, USA, pp. 368-373.

Lytras, M. D. and A. Pouloudi (2001). E-learning: Just a Waste of Time. In Strong, D., Straub, D. & DeGross, J.I. (Eds) Proceedings of the Seventh Americas Conference on Informaton Systems (AMCIS), Boston, Massachusetts, pp. 216-222.

Lytras, M. D. and A. Pouloudi (2001). IT Skills Utilization: From Rhetorical Verbalism to Applied Knowledge Management. In Strong, D., Straub, D. & DeGross, J.I. (Eds) Proceedings of the Seventh Americas Conference on Informaton Systems (AMCIS), Boston, Massachusetts, pp. 1957-1962.

Lytras, M. D. and N. Pouloudi (2001). Expanding e-learning effectiveness. The shift from content orientation to knowledge management utilization. Word Conference on Educational Multimedia, Hypermedia and Telecommunications (ED-MEDIA 2001), June 25-30, 2001, Tampere, Finland (CD Proceedings).

Lytras, M. D., N. Pouloudi, et al. (2002). "Implementing knowledge management in learning: an advanced framework for technology and learning convergence in work environments." Journal of International Forum of Educational Technology & Society and IEEE Learning Technology Task Force, (accepted for publication in the special issue of April 2002).

Lytras, M. D., N. Pouloudi, et al. (2002). "Knowledge Management Convergence: Expanding Learning Frontiers. Journal of Knowledge Management,." Journal of Knowledge Management Vol. 6(1): 40-51.

McAdam, R. and S. McCreedy (1999). "A critical review of knowledge management models." The Learning Organization 6(3): 91-101.

Mentzas, G., D. Apostolou, et al. (2001). "Knowledge networking: a holistic solution for leveraging corporate knowledge." Journal of Knowledge Management Vol. 5(1): pp. 94-107.

Miles, M. B. and A. M. Huberman (1994). Qualitative Data Analysis, (2nd Edition). Thousand Oaks, California, SAGE Publications, Inc.

Myers, M. D. (1997). "Qualitative Research in Information Systems." MIS Quarterly Vol. 22(2): pp 241-242. MISQ Discovery, archival version, June 1997, http://www.misq.org/misqd961/isworld/. MISQ Discovery, updated version, last modified: December 24,2001, http://www.auckland.ac.nz/msis/isworld/.

Nissen, M., M. Kamel, et al. (2000). "Integrated Analysis and Design
of Knowledge Systems and Processes." Information Resources Management Journal 24(Jan-Mar).

Nonaka, I. and H. Takeuchi (1995). The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation, New York: Oxford University Press.

Orlikowski, W. J. and J. J. Baroudi (1991). "Studying Information Technology in Organization: Research Approaches and Assumptions." Information Systems Research Vol . 2(2): pp. 143-67.

Patton, M. Q. (1990). Qualitative Evaluation and Research Methods, (2nd ed.) Mewbury Park:, CA: Sage Publications, Inc.

Ruttenberg, B., G. Spickler, et al. (2000). E-learning: The engine of the knowledge economy, MORGAN KEEGAN, http://www.internettime.com/itimegroup/morgankeegan.pdf.

Strauss, A. and J. Corbin (1990). Basics of Qualitative Research. Newbury Park, California, SAGE Publications.

Walsham, G. (1995). "Interpretive Case Studies in IS Research: Nature and Method." European Journal of Information Systems Vol. 4: pp. 74-81.

Yin, R. (1994). Case study research: Design and methods (2nd ed.). Thousand Oaks, CA: Sage Publishing.