

# eLearning & Knowledge Management towards Life-long Education

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## Abstract

Education will change tremendously within the next years. The significance of life-long learning and life accompanying education raises the need for new teaching and learning technologies. Although eLearning and knowledge management seem to fulfill the various requirements and much effort is being spent over years, the breakthrough is still missing in both fields. One reason for this is the fact that both fields are treated in an isolated manner. The purpose of this paper is to initiate a more integrated view of eLearning and knowledge management both in technical and in functional aspects and thus make use of possible synergy effects being visible then.

The paper starts with the summary of individual key characteristics of eLearning environments and knowledge management systems (KM-systems). It then highlights existing coincidences and interfaces in order to prove that both worlds are not as far apart as they might seem. Finally a comparative analysis is performed and some relevant issues which contain the potential for relevant synergies are presented. The paper ends with the discussion of results.

**Keywords:** Knowledge Management (KM), eLearning, Life-long learning and education

## 1 Introduction

The rapid and continuous development of the information society into a "knowledge society" is accompanied by two concepts, "knowledge management" and "eLearning". Education is of increasing importance, not only in its long tradition as primary school education, but also in its form as life-long and continuous learning process - both in business and private context. Never before in its history - mankind was more affected by the individual need for information and knowledge in order to manage private and business life. The significance of a life-long learning process can be visualized by many initiatives, where obviously the education-policy of a country is an important one. The government of the European Community has recently published the memorandum for life-long learning[6] where the right of every citizen to take part in a life-long learning process was officially defined by law for the very first time.

eLearning and knowledge management seem to be the two concepts to address the requirements of a life-long learning process. eLearning has its origin in the development of more than 30 years of computer-supported teaching and learning. It represents the conscious learning process where objectives and domains are clearly defined and the focus is set to individual learner perspectives and demands. The roots of eLearning are mainly in the education community. Knowledge management - on the other side - has been developed within business context. There are two common viewpoints on knowledge management - the human-oriented and the technology-based approach. From the human-oriented point of view, knowledge management can be interpreted as methodologies to gain, share, keep and manage knowledge[7]. It clearly focuses on the management of knowledge owners, not on the management of knowledge or information itself. From the technological point of view, knowledge management might be seen as the further development of information management systems. It thus focuses on the management of information and knowledge and the interconnection between information objects[9]. In general, knowledge management addresses more the unintentional, indirect but continuous learning processes.

Knowledge management and eLearning are commonly treated as isolated concepts. This is mostly of historic reasons, where eLearning is based upon a much longer tradition and knowledge management is a rather newly developed theme. In spite of the tremendous amount of effort being spent into both fields for many years now, the long predicted breakthrough and economic success is still missing. This might be due to the fact that possible synergy effects which could be developed out of a more integrated view on knowledge management and eLearning are still not too well realized.

The purpose of this paper is to initiate a more integrated treatment of eLearning and knowledge management. This is done by summarizing the individual key-characteristics and coincidences of both fields and then present a comparative analysis of possible synergy effects based upon this integrated view. We will show how and where eLearning and knowledge management can win by adopting useful features, functionalities and characteristics from one another.

## 2 Individual Characteristics

**eLearning** is the result of more than 30 years of technology and methodology development in computer-based teaching and learning. With the wide acceptance of the Internet in the early 90s, technology-based learning has gained a relevant innovation boost. The technological developments now enable us to deliver high-quality multi-media contents via the Internet, keep track of learner activities or support long-distance communication and cooperation - with only a few important aspects to mention.

eLearning covers the complete cycle of the teaching and learning process[8]. The most important functional aspects within this coverage are as follows. Many of them have been exclusively developed alongside with research in eLearning while others have been adapted for eLearning requirements.

**Authoring:** Through the years excellent knowledge on the creation process of eLearning contents has been developed. This knowledge covers pedagogical, psychological and didactic issues as well as technical questions. Nearly all relevant eLearning environments offer rich authoring functionality and a rather large number of companies make their living out of content production for eLearning purposes.

**Course Management:** This important characteristic does not only include the functionalities of course or class deployment on the basis of existing teaching material but also all aspects of structuring and sequencing courses. The interface to external information sources are addressed as well as the integration of practice-, test-, or feedback-modules.

**Administration and Billing:** Administration includes user management, administration of access rights and all aspects of billing which have been adapted from eCommerce and eBusiness solutions.

**Career Planning:** The functionality of computer-supported career planning is a rather new aspect of eLearning systems and it is not yet completely discovered. Only a few relevant eLearning systems support (semi-)automated career planning and tracking, yet.

**Learning, Practicing, Applying:** The most important aspect of eLearning is the learning phase. This phase includes the consumption of information, all communication aspects and of course all questions addressing interaction, navigation and use of eLearning contents.

**Examination, Test:** A mandatory part of eLearning is examination and testing. Students need to verify that they have succeeded in gaining new knowledge or skills. During this phase - the relationship between information and knowledge becomes visible with respect to eLearning. Here it is hopefully possible to see whether students have been able to successfully turn information into knowledge or not.

**Feedback:** Relevant eLearning environments try to collect and take user feedback into account. Again this is a characteristic which is not yet completely discovered, researched or implemented.

Among the above mentioned functional key characteristics, there are a lot of issues which can be derived from the use and application of eLearning during the past years. Together with the functional aspects these issues help to describe eLearning and characterize it as a whole.

**Wide Application Range:** eLearning is used as supplement to traditional teaching and learning in school and college curricula, it is increasingly being applied to corporate training and it has found its way into private education and edutainment.

**Standardization:** Much effort is actually being spent into standardization activities of eLearning. The ISO/IEC JTC-1[1], the IEEE LTSC[5] and the CEN/ISSS WS-LT[4] lead a complex certification process of eLearning standards with many different domain aspects, where many institutions take part as developing members. With every activity initiated, the significance of eLearning is raised.

**Conscious Learning Process:** eLearning represents the conscious learning which is strongly goal-oriented. Learning paths are defined and proper teaching and learning material has to be offered to the students with the respective learning goal. Tests are defined to measure the success of the learning activities, skill levels enable the correct entry point in a curriculum.

**Learning Centered:** eLearning is learner-centered. The aim is to support the individual learning process of a person or a number of persons (class) with a distinct learning goal, personal skill level(s), very individual requirements and cognitive demands. One trainer is supposed to accompany students in a class-like situation and teach and coach them.

eLearning falls back on a long tradition of teaching and learning experience.

**Knowledge Management** has its origin in the rapid development of the "knowledge society". The amount of present information has become nearly unmanageable. It is more and more important to filter relevant information from non-relevant, to combine different junks of information into a domain-specific context, to manage knowledge owners in order to be able to efficiently solve problems, to share knowledge within a group of people or simply to verify or prove the significance or truth of some kind of information. These are only a few possible fields of application for knowledge management[3].

Knowledge management is commonly being approached from two different points of view - the technological-oriented and the human-oriented way. From the technological point of view - knowledge management is commonly seen as further development of information

management systems with advanced functionality in order to fulfill the requirements of KM-relevant problems. The human-oriented approach focuses on the management of knowledge owners and all respective activities (i.e. team management, ...).

Both points of view are essential in order to describe the key characteristics of knowledge management as a whole. Sometimes, strategic aspects are also discussed as being a part of knowledge management - however - these are not considered within this paper. In any respect - the aim of knowledge management is the efficient use of knowledge on an operative level.

Six building blocks identify knowledge management with respect to required functionality:

**Knowledge Identification:** Analysis and description of knowledge domain and development of knowledge transparency.

**Knowledge Preservation:** With this building block, all social issues are addressed. It is important to motivate people to share take part in KM, to establish processes in order to formalize knowledge preservation. Knowledge has to be selected, chosen and archived.

**Knowledge Use:** Here, the focus is set to the development of brain-friendly knowledge representations and user-friendly interfaces and alike. All aspects of functionality within a KM-system are addressed herein.

**Knowledge Transfer:** This building block includes all aspects of necessary knowledge transfer and sharing. Cooperation, coordination, multiplication of knowledge through sharing among persons, formalization of experiences or best-practice transfer are just a few to techniques to mention. This aspect includes both technical and social issues.

**Knowledge Development:** Herein, the conscious process of knowledge development is covered. It includes active and passive knowledge development or the knowledge development through innovation. It also deals with automated processes of developing new knowledge on the basis of existing information through the building of innovative contexts.

**Knowledge Acquisition:** Analysis on where and how knowledge is or can be acquired. Focus on passive, i.e. unconscious knowledge acquisition through the support of KM-systems.

In some sense, knowledge management supports the unconscious, i.e. passive learning process. It helps to convert everyday life into a continuous learning experience. Among the before listed building blocks which identify and describe KM-systems, some further key characteristics may help to clarify knowledge management as a whole.

**Role-based Environment:** KM-systems are mainly role-based, i.e. they offer individualized information on the basis of role definitions. Key account managers gain

different access to the same business information than technical advisers do.

**Yellow Pages:** KM-systems support dynamic expert pools through the development and administration of yellow pages. People are identified as domain experts by tracking their everyday working activities and are added to the expert pool after approval. This expert pool is accessible and search able within the knowledge community.

**Dynamic Clustering:** This is probably the most significant feature with respect to technical functionality of KM-systems. Information is being clustered and organized dynamically based upon a set of role-based rules. The information value can be increased dramatically; previously unknown possibilities for information context are developed.

**Hybrid Information Sources:** KM-systems include a wide range of information sources into their analysis pool. Among all forms of digital information within a knowledge network, user activities and extern information resources are included.

Knowledge management has been developed as answer to the information boost. Many disciplines have had their impact on the research and development of KM-systems.

### 3 Coincidences of Knowledge Management and eLearning

Knowledge management and eLearning are two different concepts with individual history and very different objectives. Nevertheless there are many coincidences or similarities and interfacing aspects between KM-systems and eLearning environments[2].

The reasons for this are divers and will be of no further investigation here. The purpose of this section is to highlight some of the most relevant coincidences and interfaces. This is done in order to show that knowledge management and eLearning are not as different as they often may be considered.

**System Architecture:** KM-systems and eLearning environments share the same system architecture. Almost all of these systems are built in client/server architecture with most of the complexity included in the server part. More or less slim clients offer access to the systems through the use of the Internet or any other kind of computer network (intranet, extranet)

**Cooperation, Communication:** Both systems enable and support rather rich communication and cooperation features. Depending on the bandwidth and other conditions, different kinds of synchronous and asynchronous communication is possible, group schedul-

ing, application sharing, instant messaging and other forms of cooperation are supported.

**Personalization:** Relevant eLearning systems and high quality KM-systems offer some kind of personalization. The working environment can be adapted to the user need and perspective. Sometimes the personalization is role-based, sometimes it is person-oriented.

**Information Extension:** Both systems are not closed or isolated. Information is most often shared among several resources and can be changed, extended, modified, removed on demand.

**Access Regulation:** In both worlds, users need to be successfully identified by the systems. Users have to register, they are attached to a defined profile and they are given access to proper information only. Most often different layers of access rights enable the control of information access.

## 4 Comparative Analysis

Of course knowledge management and eLearning have different objectives. The purpose of this section is not to cast doubt about this fact. The aim is to perform a comparative analysis of aspects in one field which could be of significant advantage in the other when taken into account. It is the discussion of possible synergies between knowledge management and eLearning by viewing both fields in a more integrated way.

Although eLearning is sometimes classified as a 'part' of knowledge management and many manufacturer of KM-systems also develop eLearning environments - the possible synergy effects based on a more integrated view are not yet realized very widely. The discussion does not claim to be complete but it lists a few and very relevant issues which can be considered to have a significant impact on innovation and improvement of either system.

**Integration of Experts:** KM-systems offer access to expert pools or yellow pages. Every single person within the application domain might be identified by the system as an expert for a specific domain on the basis of her activity, expertise and/or skills. The job position within the company commonly has no impact on the identification process. eLearning environments lack this form of expert pool and deny students with particular expertise the possibility to share their knowledge among the class. Most often the structure of the teacher-student model is very strict and without any subject to change or discuss. Teachers are supposed to teach whereas students are supposed to learn. Teaching experience over years proves that the potential of students participating in the teaching process in particular topics of the curriculum is tremendously high. In almost any course there are students who have an expertise on some topic to an extend that would en-

able them to support the teacher in his teaching and coaching process in a remarkable way.

**Background Library:** In eLearning systems, teaching material is collected from different sources. Main parts traditionally will be professionally created by teachers. In many cases this material is supplemented by background information. This secondary information may consist of electronic manuals, reports, digital books, audio or video material or simply references on the Internet and does not necessarily be copied into the eLearning environment but can also be referenced by means of hyperlinks from within. KM-system most often focus on their own company perspectives and deny users to enlarge their individual working environment with external information (although it must be stated that security issues need to be discussed within this context first). eLearning - on the other hand - would win through the adoption of the "dynamic clustering" of information described as one key characteristic of KM-systems.

**Information Interaction:** In eLearning environments, students are used to interact with the learning contents. They are enabled to set book marks, make electronic annotations and give comments, extend the learning material with their own supplements - and do all that in private or public context. KM-systems usually lack this feature with reference to security issues. We are sure, that a functionality like this would increase the motivation to work in KM-systems and would help to solve the acceptance problems widely known with the establishment of KM systems in companies.

**Skills Management:** KM-systems commonly implement a role-based model where users are assigned to roles and offer them distinct information access and well defined working views. eLearning systems have a similar functionality where students are assigned to classes and courses and given their respective views on information. Still there is room for improvement. eLearning has traditionally more established assessment procedures, where students are judged upon their technical skills. This assessment procedures would support the graduation of employees to roles and the adjustment of necessary information views and working environments. Assessment (in this context) is hardly being found in corporate environments, where restrictions in labour legislation might be one reason for.

**Information Push / Pull:** KM-systems usually are both reactive and active. Users can query information from KM-system by means of search facilities, request forms and other information pulling functionalities. In addition to that, KM-systems usually offer information push technologies. Depending on the role (position) of the user and her field of interest and activity, information of possible relevance and interest is presented in a timely manner without the need for in-

teraction or initiation of the user. Intelligent feedback mechanisms help to fine-tune the information sources and improve quality. eLearning environments would significantly increase efficiency and quality by adopting services alike.

**Dynamic Relevance Judgment:** A key feature of modern KM-systems is the automated and dynamic relevance judgment of information. Information is not only judged by significance of the authoring person (standards work group, management, expert peer group, ...) or the official status of the document (standard, law, guideline, report, working report, ...) but also on the value the information has for the target group. If information is not used by a target group, then it obviously is of little relevance. If - on the other hand - some information with minor official significance is heavily used by others - then this might be an indication of a high relevance (referring to the information value). The adoption of this principle to eLearning environments would help to judge and qualify information resources and learning contents.

## 5 Summary

eLearning and knowledge management are of increasing importance in our society. The field of application is not restricted to company environments nor is it bound to primary education through out schools or universities. Life-long learning and private education will be of continuing significance in the near future.

Both eLearning and knowledge management seem to address the high demands on continuing education, though - neither of the actual implementations appears to be the sole winner. Within this paper we have summarized the individual key characteristics of both representative systems and have pointed out some of the many coincidences and similarities. Finally we have presented a comparative analysis of possible synergy issues where one field could improve by adopting another fields functionality.

We are sure that the continuing education can only be supported by an environment which combines both - eLearning and knowledge management.

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