Expanding e-learning effectiveness.
The shift from content orientation to knowledge management utilization.

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Abstract: The e-learning industry in recent years faced a tremendous development. The technological capabilities of modern tool-sets expand from off-line to on-line solutions covering a wide spread of learning needs (Close et al, 2000), (Ruttenber et al). Nevertheless the requirements of modern business units seem to diversify from training seminars to corporate learning portals implying a desired reinforcement of capacities for effective actions. Academic institutes such as universities have to adopt their traditional approaches in the modern setting. The e-learning initiative both in corporate and academic environment defines new ways of improving performance. The objective is to reveal the necessity to formulate dynamic learning environments capable to be customized according to value perceptions. The research effort is concentrated on the definition of variables that will enhance the value justification of such systems and will realize the modularity of a value creating e-learning environment through advanced knowledge management systems.

INTRODUCTION

The establishment of e-learning systems within business settings or academic institutions is something like fashion. Many models, many different types, many markets, many interest groups, different degrees of satisfaction and many users looking for customized solutions (Urdan & Weggen, 2000). Unfortunately the e-learning market is not as mature as we would prefer in terms of effective solutions, advanced functionalities and learning standards.

The analysis of the e-learning market in Europe as well as in USA is not only difficult but it has to be based on issues closer to effectiveness than to population increase. In most of cases the virtual universities, the e-learning systems base their functionality on a simple browsing mechanism accompanied with a section of web links and a few on-line quizzes. In other words which is the value of such a system when in most of cases the employment of the ICT's is limited on static learning scenarios. We could state that these systems secure the growth of the so-called distance-learning marketplace in Europe even though the learner satisfaction from such a system is very limited. A critical question is can we enhance the learner satisfaction on an e-learning system or his first impression will be negative. The mass of integrated e-learning platforms seems to be unable to support different degrees of value delivery. They seem to construct their powerfulness over common characteristics that in general simulate the traditional way of teaching. So a number of critical questions emerge:

Does e-learning differentiates from the traditional learning? Can we define concrete ways of content enrichment in virtual environments, which add value in traditional learning content and support dynamic learning settings? Can we justify theoretical foundations that prove the different value layers of learning efforts? Can we test the ability of learning environments to support different educational goals through the employment of different learning processes? Can we develop learning environments capable of supporting the intellectual capital exploitation both in academic and business environment? Finally but not least, can we formulate a framework that will support the Enterprise Application Integration in a manner that will take into account the learning needs of business units? In other words can we define an application layer within business Intranets that will establish knowledge management architecture?

Our experiences from various projects related to e-learning can be summarized in the figure 1. The *learning effectiveness*, a concept with various quality factors included, has a direct relation to the technological complexity

of the e-learning environment. The distinction of five relevant learning paradigms is not only a theoretical value hierarchy that formulates a contextual setting for analysis. It rather gives an essential feeling for the inability of many e-learning initiatives to be effective for the trainers and the trainees.

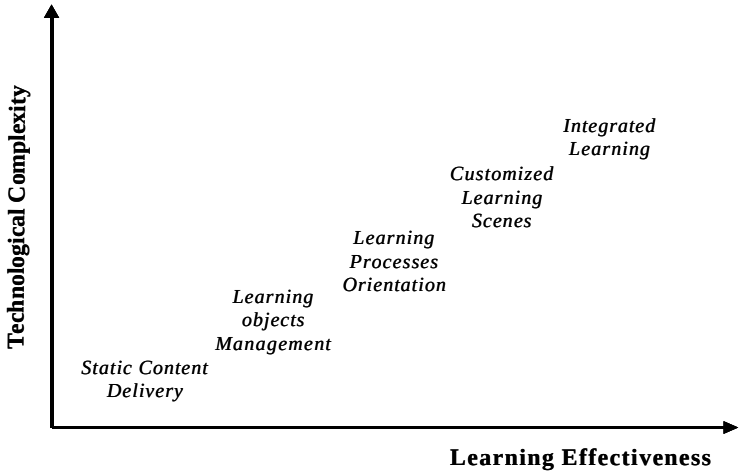


Figure 1: The e-learning paradigms evolution

The five learning paradigms that deliver different levels of value are:

STAGES OF E-LEARNING EVOLUTION	
1. Static Content Delivery	Content selection, Html Authoring
2. Learning Objects Management	Knowledge Base, Metadata, Value Components
3. Learning Processes Orientation	Learning Processes Specification, Pool of LP
4. Customized Learning Scenes	Learning Needs Recognition, Learners Profiling, Learning Styles, Learning Paths
5. Integrated Learning	Application Integration, Corporate Portals

Table 1:The technological characteristics of the five e-learning paradigms:

The majority of e-learning initiatives are limited on the application or the customization of learning platforms that facilitate the delivery of learning content on a predefined, static and sequential way. The flexibility of such implementations is rather inadequate to support the dynamic nature of learning, but as it is the easiest form of doing e-learning it is also the common one. The incorporation of knowledge management mechanisms in learning platforms such as learning objects databases supports the effective management of learning content in terms of reusability and utilization of knowledge bases. This functional enhancement of e-learning environments is not enough to utilize the learners' perception for e-learning usefulness.

The inability of the two first e-learning paradigms to provide dynamic features to the learners as well to the trainers set a "wall" that has to be penetrated in order to exploit further the effectiveness concept. This penetration has to be based on more sophisticated technological components that allow the establishment of dynamic e-learning strategies. The orientation of e-learning to the learning processes that define the learning paths for the trainers is very critical. The detailed analysis of different learning processes provides a pool of available learning scenarios. The reveal of learning paradigms that penetrate the "wall" require more advanced technological infrastructures. For example the dynamic combination of learning processes in e-learning environments have to take into account the full support of the embedded learning subtasks. In other words the engineering of such a system will need enormous effort for the well-justified distinction of learning subtasks and subsequent technological required components.

Another consideration for the enhancement of effectiveness should be the profiling capability of an e-learning platform to utilize its components on the direction of creating *one to one learning situations*. The recognition of learning needs, the diversification of learning styles, the categorization of learners according to their preferences in specific learning processes, their interest in specific learning objects that cover their knowledge deficit are namely parameters that differentiate the e-learning paradigm of customized learning scenes. The profiling procedure for the accomplishment of such a scope has to be based on advanced algorithms and of course extensive parameterization of the e-learning environment. The multifold flexibility seems to be a well-defined effective learning goal but in order to be tested and to be implemented it needs enormous research effort. Finally the need to develop effective knowledge management mechanisms in modern business

units, sets a subsequent goal to integrate e-learning systems with other critical enterprise applications. The orientation of e-learning to business process knowledge management in modern e-businesses and enterprises of the digital economy formulate a context on which the learning content has to be discovered in all the spread of the daily business operation. The tacit and explicit knowledge that is hidden in people, business processes and services has to be captured and promoted in e-learning systems. The Enterprise Application Integration dimension of e-learning paradigms nowadays is the piece of the puzzle that has to be incorporated in e-learning paradigms. The critical issue from this perspective is to be able to develop a grid on which every business processes could be related with specific learning processes. A first implication of our intention to create a theoretical tool capable to map the relation of a business processes to a mix of different learning processes is a grid that helps the relation of any business process to specific learning processes according to their embodied value. A learning scenario is a combination of learning processes that formulate the educational space for the trainer and the executive trainee. A first approach is presented in figure 2.

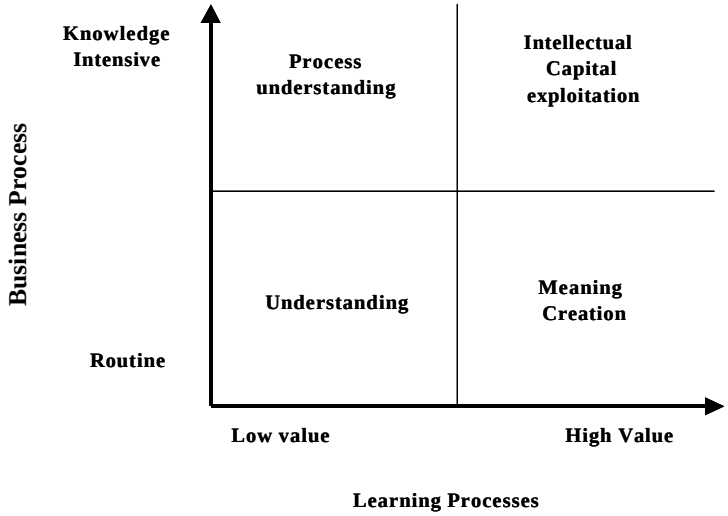


Figure 2. The business to learning process grid

The two dimensional grid defines four separate quadrants capable to describe four different learning situations. We distinguish four learning situations that are supported by different learning processes:

1. Understanding
2. Meaning creation
3. Process understanding
4. Intellectual Capital Exploitation

The conceptual model implies that every business process could be break down into separate business tasks that can be positioned somewhere on the learning grid. Consequently this approach could be analyzed further in order to specify in a more detailed way the parameters of each learning situation. The selection of specific learning processes changes the mode for the executives training. The selection of advanced learning processes with increased information transformation requirements enhances the quality of the achieved learning goals. The value delivery through the e-learning paradigm is organized through the employment of specific learning templates. So, the Author of such a system is going to be navigated through an advanced mechanism on which the main role is to choose the learning situation that best fits the trainee needs. Of course the value dimension of such a system is not implying a concrete measurement system of value satisfaction. The intention is to formulate a method on which the trainer would be responsible for the maintenance of all the content material capable of supporting different value levels of trainee exploitation. The difficulty of this ambitious aspiration is the development of a metadata content classification mechanism that will support the classification of the learning content on the e-learning system knowledge-content base.

CASE STUDIES

Our research unit (eLTRUN, www.heltrun.aueb.gr) in the past three years has participated in the design and development of e-learning systems both in European and International level. In parallel the realization of the need to utilize e-learning solutions gaining experiences from knowledge management theory formulate a two-fold approach: The analysis of e-learning from knowledge management perspective.For this scope we understand the necessity to research on the linkage between the efficiency of e-learning systems and the capacity of

knowledge management mechanisms to provide a core component for e-learning. But even though the capacity of modern systems to manage the knowledge effectively in terms of data management mechanisms we concluded that something more was missing on the puzzle of effectiveness. The analysis, the specification and the formulation of a concrete e-learning pedagogy (Lytras 2000) in terms of learning processes, learning styles, learning modes and learning motivation parameter (Lytras 200). The previous work related with our research has to do with various e-learning projects implementation.

The **Teletraining Center of Athens University of Economics and Business** (www.teleduc.aueb.gr) was implemented in order to provide a pilot e-learning system capable to support the delivery of four seminars all over Greece, covering topics such as electronic commerce, statistics and marketing. The technological infrastructure includes servers, digital cameras and three of the most popular e-learning platforms such as WebCT, Lotus Learning Space and Blackboard. The first analysis of a survey conducted having as a sample the students of the e-commerce seminar provides useful recommendations: First of all it was more than clear evident the need to enhance the functionalities of the system with dynamic ways for the construction of learning content. The limitation of the e-learning platform to support students in different modes than sequential browsing of learning modules was a major disadvantage. More over the inability to provide mechanisms that would facilitate the exploration of knowledge according to specific learning needs was pointed out as a learning obstacle. From teacher's perspective there was a major difficulty at the reconstruction of learning material since there is a limitation in html pages linking. Additionally the content management constraints the creativity and doesn't support flexible learning scenarios [8].

The GEM consortium, **Global Master in Electronic Commerce) (**www.heltrun.aueb.gr/gem/new) is an international network of business schools sharing a common curriculum in e-commerce at the master's degree level. The global character of the program is ensured through the official cooperation of the best business schools and universities in Europe and North America, all experienced in research and education in e-commerce. The program has received the endorsement of the European Commission and G7's Information Technology group.

The development of an e-learning facility was considered from the members of the consortium as a vital process of the whole master program and for this reason there was an extensive research on the capabilities of the integrated platforms to support the whole approach.. The Athens University of Economics and Business undertake to develop the e-technology course for e-commerce master program..

The **MODEL IST (Multimedia for Open and Dynamic Executives Learning)** project is an innovative approach pursuing the development of a dynamic learning environment capable of managing effectively the knowledge in business units. The MODEL approach is trying to define a new market of knowledge management solutions and tools. We could describe it as a niche market that facilitates the development of competencies and the exploitation of the human capital. The core competencies in the modern organizations are constructed through vital business processes that in general provide a web of interconnections among people, knowledge resources, customers, tasks and evaluation standards. The major observed problem in the current situation is the absence of knowledge management systems that increase the re-usability of knowledge for training purposes. The executives training is mainly accomplished using executives' seminars and various workshops with reliance on not clearly defined quality standards. Moreover most of business units suffer from their inability to support new hired employees according to the specific characteristic of core business processes and business environment in general. The cost for training a new employee is superlative and increases if we take into account knowledge oriented and not routine business processes. In other words we have an exponential increase for the cost of training or learning when the subject of the training is more value creating.

In the Leonardo Da Vinchi project called e-LEARN we investigated the capability of WebCT to support English language courses for public sectors executives in collaboration with Linguaphone. Finally the project ESWL (Educational space without limits) set a postgraduate master course available to the students of three master programs in Greek Universities with the use of WebCT. All these projects and extensive research has reinforce our approach for e-learning. The major components of our approach for e-learning effectiveness and evaluation are presented in the following section.

DYNAMIC LEARNING CONCEPTS

The e-learning concept can be really treated as a technological advancement with advantages and disadvantages. The ability of the information and communication technologies to realize its various components formulate a wide range of applied informatics. On this continuum of available technologies we have to incorporate intelligence in order to enhance its performance and efficiency. The common practice to buy an e-learning platform, to adopt content or to buy content and to deliver on 24-hour basis the learning material to various learners has a justification: It provides an easy way to claim your presence on e-learning irrelevant the absence of mechanism that exploit the value diffusion for the learners and the trainers. Our approach is setting or is currently researching the ability of a three-dimensional model to expand the traditional considerations for e-learning importance. The Multidimensional Dynamic Learning (MDL) Model is based on three complementary dimensions:

- *The Knowledge Management dimension*
- *The e-Learning dimension*
- *The application integration dimension*

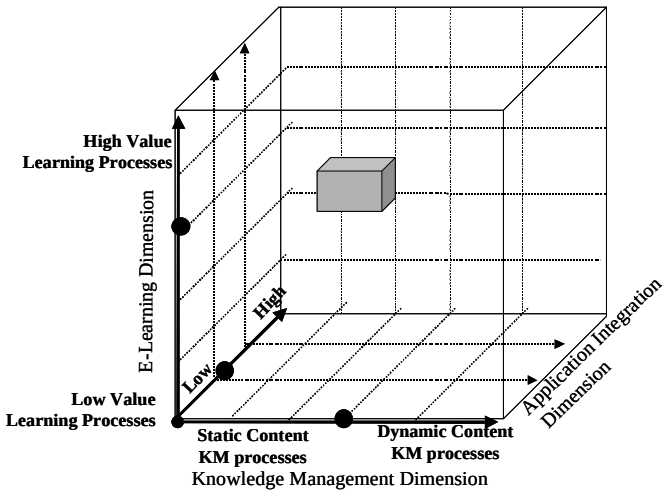


Figure 3: The MDL cube

Each of these describe in synopsis detailed considerations that confront the e-learning platforms such as knowledge management systems with embedded e-learning pedagogy and capacity of dynamic integration with other crucial business applications. To be more specific we will use three explanations for the three dimensions of MDL model.

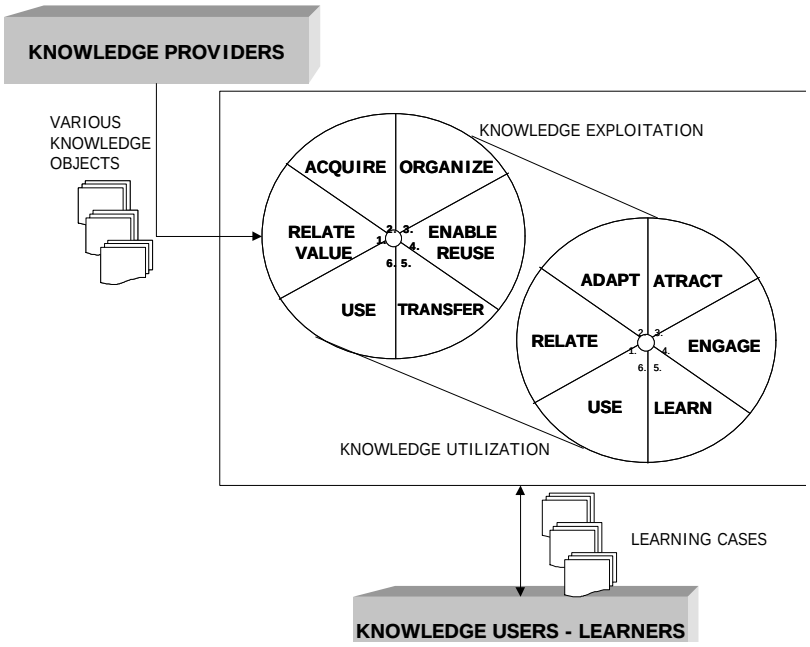
The **Knowledge Management Sophistication** summarizes the ability of the e-learning platform to manage learning content in various formats, to re-use learning modules and to support knowledge management processes such as knowledge creation, knowledge codification, knowledge transformation and knowledge diffusion.

The **EŁearning Dimension** stands for the ability of an e-learning system to construct effective learning mechanisms and learning processes that support the achievement of different educational goals. With no doubt this dimension incorporates issues like learning styles, learning needs, learning templates as well as learning specification settings. The majority of e-learning platforms do not support mechanisms that would enhance the re-usability of learning content. The enormous efforts that have to be paid in order to redesign learning content or to adopt traditional content for e-learning purposes burdens the effectiveness of these tools. Our model, claims that the KM sophistication dimension is exploited enough when there are established knowledge processes that manipulate dynamic content. The re-usability of content and the support of high value learning processes presuppose the presence of an advanced KM subsystem capable to categorize, to enrich and to integrate various learning objects. Consequently the enrichment of learning content with various metadata is necessary for the application of dynamic learning. Very few learning platforms can nowadays provide metadata to the learning content and when this is applicable there is no a mechanism that allows the data mining of relevant learning objects from the learning warehouse system that manages the learning content.

The **Application Integration Dimension** summarizes for the e-learning platforms the capacity of collaboration with other business applications in order to obtain learning content from real business operations. This dimension seems to be the less detected on the common e-learning platforms and this causes a number of gaps for the effective implementation of e-learning systems. The critical issue of insufficient content in many situations is due to the inability of the organizations to establish a knowledge generation mechanism through the operation of information systems that support the most important business processes. Because in general, the e-learning systems in corporate environments can play the role of the most significant intellectual capital exploitation mechanism. (Stewart 1997).

The e-learning marketplace has been face a tremendous orientation to static approaches. Through the combination of the two life cycles, the knowledge management framework and the e-learning life cycle, the knowledge objects are transformed dynamically to learning products through specific consideration. The XML language increases the capability for the inclusion of semantics in knowledge objects and every knowledge stage as well as every stage of the transformation model enriches the initial knowledge objects with specific metadata. This approach has to be based in integrated approaches, which include ontologies (Staab and Maedche 2000), (Staab et al., 2000), knowledge management, semantics and annotations (Perez and Benjamins 1999).

The proposed model that is presented in figure 4 depicts the double loop knowledge management exploitation. With no doubt the full utilization of the proposed model requires further explanations and justification. For example in our approach the transformation framework intends to support a sophisticated e-learning system



where the educational scene is constructed dynamically through the deployment of well defined learning processes.

Figure 4. The integrated e-learning knowledge management framework

PAPER CONCLUSION

The MDL model approach sets a method for the evaluation of any e-learning platform. Of course the presentation of the method on this paper was limited due to the length limitation. The whole approach of MDL cube MODEL is supported by a number of accompanying frameworks and theoretical concepts, which in collaboration enhance the scientific justification.The development of a system that will realize the upper right layers of the cube is currently our research priority. Of course the required modules need extensive justification and creative work. We believe than in one's year time we will be able to launch international an integrated e-learning knowledge management system with the characteristics that we mentioned on this paper. The refinement of our approach is a continuing process and will be supported by a number of new projects that we are going to propose in Greek and European Commission programs.

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