

EFTWEB: TOWARDS A CONTENT MANAGEMENT SYSTEM

An approach to assist education, learning and training activities

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ABSTRACT

EFTWeb is a World Wide Web based learning system developed to support both presence and distance learning. The EFTWeb model offers the means for content management of educational material, taking into account user needs, security and economic issues. It also provides integration and user/content independence taking advantage of its flexible architecture.

This paper briefly presents the model and discusses EFTWeb content management approach to education, learning and training activities stressing how important are systems that allow the ongoing change of business operation models. The authors believe that model flexibility will be one of the characteristics of emergent operation management systems.

Keywords: content management, computer-mediated technologies, operation management

INTRODUCTION

The digital economy obeys to very different paradigms from the traditional ones. The later ones are based in a form of analysing the chain of operations and the chain of value (Kalakota and Robinson, 2001). This analysis presents a demand based perspective giving total priority to the customer and forcing the manager to maintain a constant attention on market evolution and in particular to customers. Also, the operations chain composition and its redefinition are very important factors of success of the new business in the digital economy era.

These characteristics of the digital business in the Society of Information allows, with great easiness, starting from the information picked up in the most varied sources and for the most several forms, to store, to negotiate, to conceive, to produce, to reconfigure, to manage, to implement and to control the development of new products, including the opening of enormous opportunities in the field of the education, training and learning.

Rethinking education, training and learning is crucial. It can be seen as a group of services, in a perspective of the demand to the offer, and conceiving it as a product that allows its easy transformation in a service and making it more useful to the students and professionals. It is important to state that, more and more, students are seen as customers are information and knowledge buyers are. But they also can be seen as knowledge builders!

EDUCATION, TRAINING AND LEARNING IN THE WEB

Education, learning and training constitutes one of the areas of great potential for innovation. This enormous potential can promote modifications both in the processes and in the way that these activities are performed. It is currently accepted that education, training and learning will meet, in a close future, among economic activities of larger importance.

Although they exist countless pedagogic projects using information and communication technologies, few among them introduce the technology together with process redesign of

existent practices (largely secular) of education, training and learning, mainly in what it concerns to the presential teaching.

However, Education, learning and training is on move. Despite presential teaching almost remains the same for the last four centuries (Puttnam, 1996), with current available information technologies and its impact each day new signs can be seen of the growing difference between what students want and what society needs and what institutions can provide. Even teachers seems somewhere lost by the pace of change and by the lack of interest among students to attend, discuss, and produce work in a traditional education environment.

Opportunities to take advantage of information technologies in educational contexts are reported by several authors: (Harasim, 1995) and (Papert, 1993). In particular, there is an opportunity to innovate by reinventing time and space constraints in educational settings (Gouveia, 1999a) and also introducing computer and network support on presence teaching (Gouveia, 1998). There is a need to rethink existing processes.

However, the use of Information and Communication Technology (ICT for short) generally do not introduce innovation into educational practices although they offer tremendous opportunities for that (Goodyear, 1999).

EFTWEB SYSTEM PROPOSAL

Basic model concepts

The EFTWeb system proposes an innovation of the education, training and learning process, through the use of the Web by presenting a framework that bases teacher and students interaction on the materials and tasks to be accomplish. In the proposed model content has the same importance than the means for classifying it (Gouveia et al., 2000).

The EFTWeb model was designed to support three main concepts for content structuring - unit, theme and content. A unit possesses themes and for them corresponds presential sessions or module units. Each theme has a group of contents that aids information and knowledge transmission. A content is an independent object of a given format, among the many multimedia available supported by Internet.

The organisation scheme for user access, unit - theme - content, is given by the notion of a guide. A well-defined sequence of the referred elements is associated to structure contents and give to the user a path to explore information (Borges Gouveia et al., 2000).

One of the underlying ideas for EFTWeb is to support with maximum flexibility content access by giving total permission to use available resources and facilities. This is implemented by assigning a particular profile to each user. To support it the model implements a credit based system allowing each user the access to a given resource based on a cost for each unit retrieved. Each user receives a given amount of credits that can use with some degree of freedom. The EFTWeb user can be an individual or a group of individuals like a class. A user can be any teacher or student.

An important model characteristic is considering each user a client. The model allows the necessary flexibility to consider users as potential consumers and producers. This way, the system provides support to organise student's works and integrate them in the content offering by appropriate control of author rights and content's versioning and certification. It also allows teachers to build along with content, new or existing guides based on others work. This can include, in all or partly, already existent guides. This user can also introduce enhancements in the way content is classified.

Technology support

The EFTWeb model is implemented with available widespread technology. To support content distribution, World Wide Web becomes the natural solution. It has a lot of information available that needs to be mediated for being trusted. Also, its information can be searchable and exists in a digital format, in particular using a textual search engine. Web access is possible with a personal computer and its cost is acceptable.

To support content, database technology is used. This technology eases the storage and retrieval of contents and supports multiple and concurrent accesses supporting multimedia storage and logs activity. It also provides proven means for search and dynamic maintenance of contents and model data structures.

To support semantic structures, where relations between contents are of importance, thesaurus technology is used. This will provide the necessary flexibility to access content by using a set of ordered concepts that allows to store, with each content, independent semantic and high order relationships.

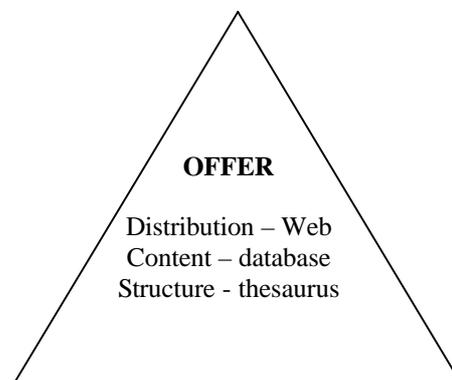


Figure 1. The offer in the EFTWeb model

The combined use of World Wide Web, databases and thesaurus technologies are designed as the support for the system offer - distribution plus content plus structure - and constitutes the system core added value. Figure 1 represents the model offer.

One of the more relevant features of this model is the use of thesaurus technology to structure content semantics. The thesaurus is used to describe a particular model of knowledge about a given area in terms of keywords and relations between these keywords. The system allows the creation of several different structures in the thesaurus, for different overlapping classification systems to use at the same time.

From the user perspective, the Web browser integrates system functionality by offering a common and easy to use hypermedia interface. This option allows for the technology integration without increasing user client complexity to configure and use. Its use also allows integration with Internet and Intranet existent facilities.

Model entities

EFTWeb model considers in its core some support for security and billing issues. The entities represent the interface with external issues like client, security, and billing (figure 2). These three entities were selected in order to provide a clear business orientation for the EFTWeb model

EFTWeb user types

Three types of users should be considered. The normal user can be a teacher or a student. The administrative users are responsible for the normal definition of the system offer and operation. There are two types of administrative users: the ones that deal with the base offer definitions and the thesaurus administrative users that are responsible for maintaining multiple catalogues and thesaurus.

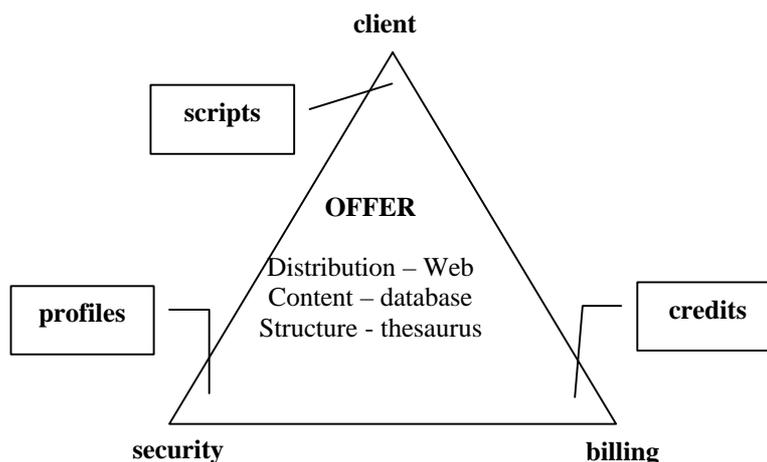


Figure 3. The mechanisms in the EFTWeb model

The model also proposes two types of services: administrative services that allow administrative users and thesaurus administrative users to enter the information necessary to the system operation, like user information, content and structure information. The administrative services are:

- certifying and authoring: certifying contents and authoring scripts;
- version control: promoting and maintain related content collections;
- catalogue creation: complementing the thesaurus with additional information by introducing lists of available thesaurus keywords with correspondent weighting factors.

System services

The system takes advantage of existent world wide and low cost web facilities. It is based on a client / server architecture where the core content is stored in a database and all the interaction between the system and users is made by a web browser using standard facilities (no plug-ins).

The novelty is on the model used to create the database structure, where focus was directed to clients, security and cost supervision. In order to fill these requirements, some integration mechanisms have been developed. In the system core, contents classification (metadata) based on thesaurus technology is placed along with the contents, allowing great flexibility in the terms definition.

The EFTWeb can be used as broker to assist both teacher and students needs by providing content in context. Different educational contexts can be envisaged as resulting from presence education support, distance education, and training or even instruction activities.

The current EFTWeb version supports several services including the use of a recommender system and the support for co-operative work for tracking document and folder sharing (version management). These facilities along with the more usual electronic mail, news, forum and chat provide a set of services integrated with the content database and a thesaurus based content classification for access and search available content. Users can also trade content by using credits to buy and sell contents. Security issues are implemented in the base system in order to certify who is doing what respecting a given content.

The implemented user services are (Borges Gouveia, 2000):

- mail: each client must have access an email address to send/receive messages;
- dialog: allow client chat in real time. The service is organised in rooms that groups users by topic;
- personal area: works as a system portal, proposing a link collection;
- personal folder: the place where the client place his documents with the option to share them;
- search engine: available in two modes textual search and thesaurus (by directory);
- guides: this facility defines the content sequence "knowledge road" to be used. It groups other guides, units, and content.

IMPACT ON EDUCATION, LEARNING AND TRAINING PROCESSES

Considering current education, learning and training processes, the ones that are proposed by EFTWeb favoured content reuse by allowing its combination based on existing context creation facilities. These facilities are implemented by the creation of a thesaurus and its flexibility based on alternative catalogues for each context thus allowing alternative models to user access content. These models can exist and be used at the same time for different users and be replaced at any time for each user, providing alternative contexts to access content.

Virtual integration of the supply chain

To operate an e-business requires supply chain management SCM skills. A successful SCM strategy is based on accurate order processing, just-in-time inventory management, and timely order fulfilment (Kalakota and Robinson, 2001). To design an order processing and its pick, pack, and ship operations in an integrated way both associated processes and technology need to be considered. As proposed by Michael Dell, the flow of information through the supply chain must be effective (Serwer, 1997).

Today, there is a need to speed up responsiveness to satisfy market demands. The most pressing issue facing modern business is no longer about reducing manufacturing costs and making the highest-quality product. The issue is about delivering value to the customer what they want, when and where they want it, and at the lowest possible cost. A rapid, cost-effective and reliable demand fulfilment is needed to support this new value proposition (Kalakota and Robinson, 2001). Education, learning and training is no different, when considered as an e-business.

The supply chain can be called as the process umbrella under which products are created and delivered to customers. As stated by (Kalakota and Robinson, 2001), a supply chain refers to the complex network of relationships that organisations maintain with trading partners to source, manufacture, and deliver products structural perspective.

In the case of EFTWeb inflows, outflows and products are digital-based. Also, complex relationships need to be developed between who provides content, context, course designers, and customer demand. Activities for content purchasing and authors procurement needed to be take part of the supply chain management. A stock management facility supports the discard activity concerning not used content allowing purging available content database.

The EFTWeb model provides for education, training, and learning, a content management system, which allows information visibility and accountability. Taking for reference that SCM is the co-ordination of material, information, and financial flows between and among all the participating enterprises in a business transaction (Kalakota and Robinson, 2001), EFTWeb can be seen as a virtual integration of the supply chain regarding the education, training, and learning business.

(Kalakota and Robinson, 2001) states that SCM is evolving from the current enterprise-centric models to more collaborative, partnership-oriented models. In some cases, as Dell's one, create a streamlined supply chain model with mass-customisation and customer-direct capabilities. EFTWeb proposes the merging of such a direct focus model with the role of information brokerage.

The justification for the lack of integration between supply chain planning and execution have a number of impacts (Kalakota and Robinson, 2001):

- customer service levels, causing too much or too little inventory;
- vision of the future demand and its impact on production;
- production changeovers considering the agreement among customer service, distribution, and manufacturing on what products are required, when they are needed, and where;
- stocks, causing having the inventory in the wrong place at the wrong time.

EFTWeb allows the possibility to support collaborative planning applications using available information to facilitate the delivery of the right products on time, to the correct location, and at the lowest cost.

CONCLUSIONS

To consider EFTWeb as a valid and mature ICT product for educational use three main goals must be accomplished:

- flexibility: concerning the production process. The production includes contents, thesaurus and guides;
- diversification: by means of reusing existent content in new guides (contexts) and upgrading them with new contents or improving existent contents;
- differentiation at the product level, by offering content and guides for satisfying each client needs.

EFTWeb can be of help in the emerging of new approaches to the education business not only by supporting but also for packaging contents and facilitate its management. It proposes a virtual integration of the supply channel where content access, demand, package orders and service are integrated based on the EFTWeb engine. By proposing a content management system, the EFTWeb allows for the creation of a digital layer to connect exiting players and resources in the education, learning and training business.

Future work will focus both on the use of the system to support real work situations and to integrate reference to non-digital materials. There is also the need to consider service facilities to apply existing packages. An example is in the case of presential teaching where beyond the use of content other logistic conditions must also be considered as the availability of reading materials some time before the class and, at the time of the class, computer, audiovisuals and experimental support materials.

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