

EFTWeb: Towards a service centre for Education, Learning and Training

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Abstract

The EFTWeb results from research efforts concerning the lack of integrated solutions to reuse the contents generated ongoing by teachers and students from each discipline. EFTWeb supports Education, Learning and Training, taking advantage of existent Web facilities. In the proposed system, teachers and students are treated as clients. These clients can choose a profile, use credits they have acquired, and be certified as content producers. EFTWeb has several integrated services: *webmail*, *chat*, *recommender* system, and document sharing. A browser interfaces these services as well as the access to on-line information for both presence and distance learning.

Supported by EFTWeb facilities the authors defend content organisation and access as a service centre to support education, learning and training taking advantage of existing contexts to satisfy needs and support normal activity of both teachers and students.

Introduction

Education, learning and training is on move. 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, 1999).

The initial research motivation for developing the EFTWeb system can be stated as (Borges Gouveia, 1999):

- find better ways to facilitate education, learning and training support, taking advantage of existent widespread technologies;
- allowing to transform information and knowledge into skill;
- innovate in the learning process, by letting the user learn by doing;
- allowing system application to multiple knowledge areas;
- allowing content access, communication and broadcasting in multimedia format;
- fostering the development of skill networks.

The last requirement is strongly related with the community in a sense that skill networks just occur when organised communities are in place. Skill networks allows a group of people to know who has know how and experience about a particular subject/matter and takes into account factors as trust, emotion, opportunity and proximity. For a detailed discussion see (Oravec, 1996).

Basic model concepts

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, based on these three concepts, is given by the notion of a guide. A well-defined sequence of the referred elements is associated to structure contents and gives to the user a path to explore information.

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 also be any teacher or student.

Another 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.

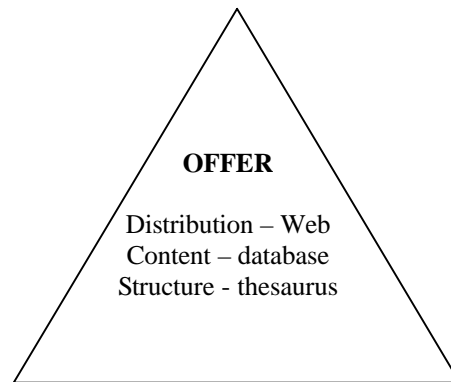
Technology support

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.

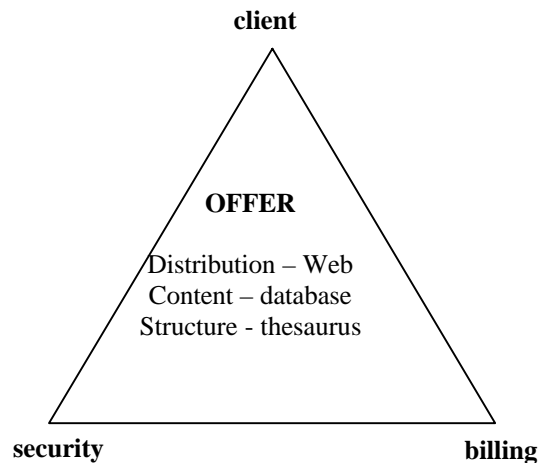
Model entities

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

- *client*: includes teachers and students. The model allows a client to be a consumer and also a producer;
- *security*: deals with the need of protecting client identification and client system use. Also included user operations allowed and what can the user really do, modify, comment and add as content and context information;

- *billing*: allow the necessary arrangements to use the system in a commercial way, where different types of promotions, paying education, learning and training programs, and fees can be applied.

Figure 2. The entities in the EFTWeb



Model mechanisms

The model mechanisms are used to interface the offer with the entities presented. The mechanisms receive the information from corresponding entities and provide the processes and storage needs to deal with entity requirements in a flexible and independent way.

For each entity, the model offers a correspondent mechanism that acts like a system translator between each entity requirements and the functioning for system offer integration. The model mechanisms are defined as (figure 3):

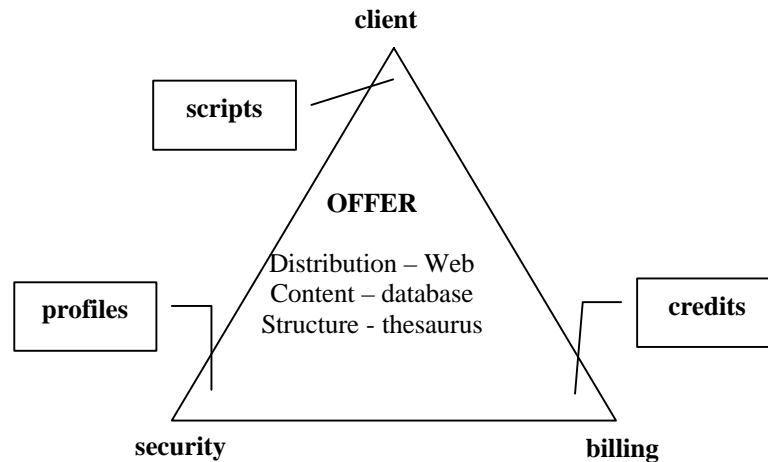
- *scripts*: having the distribution, content and structure as an organised and available offer, to each client can correspond a particular path that shows a set of selected offer;
- *profiles*: corresponds to how each client can interact with the offer, by allowing different levels of functionality to take place. These levels are described as use, read, execute, comment, add, certify and evaluate;
- *credits*: allowing client' interaction with the offer in a cost based approach. Each content or each kind of interaction can have a particular cost or be rewarded with credits. Credits also allow system usage regulation by controlling accesses. The credits mechanism interact with the billing by allowing an internal unifying cost for tracking usage and a commercial independent pricing.

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 current 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

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). The same author considers the need to reflect on the nature of students' activity as apprentice knowledge workers. Most of the processes involved in education, learning and training have as its central actor the figure of the teacher or tutor. We may notice better this in presential teaching where the teacher make the rules, impose the learning pace and the needs to be satisfied.

Traditional processes involving education, learning and training are composed by a number of mixed activities. We can try to enumerate them as four independent ones:

- *lecturing*: content transmission and facilitation;
- *certifying*: validating contents and education contexts;
- *evaluating*: validate and assess client (teachers and students) knowledge;
- *production*: content creation, methodology elaboration and technology selection.

This proposed four activities decomposition could introduce more flexibility to the people responsible for delivering education, learning and training. Also, institutions may specialise themselves in one or more of these activities. This means that new business rules may apply when the requirements for education, learning and training become more community centred.

Community centred education, learning and training may respond better to lifelong learning, continuous learning and more oriented "*real world*" contexts, both just in time and place delivery of skills and practices instead of closed curricula formal specification for the average student.

This can cause a huge impact in the institution. However, for the professional most of its activity remains the same. The main difference for the professional is getting more specialised not into a given topic but in the process itself of being specialised in one of the following activities of being lecturer, "*certifier*", evaluator and producer.

The shift from a *time*-based to an *information*-based system can be done using ICT and systems like *EFTWeb*. *EFTWeb* proposes a model for the integration of information that can be gathered from different institutions or groups of people each one responsible for one or more of the presented activities. Not necessary just one institution for each activity but a group that interacts for produce the information needed for the lecturing, certifying, evaluating and production activities. The established communities also tend to be influenced by flexibility on time and place restrictions resulting from ICT adoption.

Conclusion

EFTWeb proposes a system that unifies contents and their operation under education, learning and training activities. This will allow the necessary technology infrastructure for supporting a service centre for education, learning and training. The authors defend that a system like this can have a strong impact in the way we organise education, learning and training activities.

By using available *EFTWeb* services a client can share documents, use others content, follow contexts for learning by using *guides* as well as the thesaurus and catalogues for semantic content classification. A client (been teacher or student) can earn credits from its actions proposing documents to be included in the system or by proposing semantic content as thesaurus and catalogue enhancements. A facility for comments others contents and guides eases the creation of community opinion generation for "*content best use*".

The facility of reuse each client guides for creating new ones can enhance the way teachers see itself as a producing community. In turn, for students, the existence of a memory for their work after courses completion may lead to a different perspective of production of essays and other evaluation students' materials. This may lead to the completion of an ongoing knowledge base of content and context.

EFTWeb proposes an infrastructure to support an approach to Web based learning that goes largely beyond content as discussed by (Figueiredo, 2000). The joint co-existence of content and context will enhance and promote the existence of learning communities were its experience, work and style can be stored and integrated along with "*pure*" content.

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