



I-Questions of the lesson indexed in a WIS oriented to the e-learning

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Abstract

In the present work a tool called Indexed Questions (IQ), integrated in the system of the "indexed lesson" object of a previous work is described. It allows the learner to ask queries online with the possibility to link them to an index that directly goes to the interested video-lesson part. These queries once stored in the database, appropriately organised by the teaching team, will enrich the system knowledge base, guaranteeing at the same time high levels of interactivity. Following the didactic paradigm of the WIS-learning the tool object of the present work wants to underline the development of a system that overcomes the classical tools today present in the e-learning environment, that is able to enrich the information share between the learners and able to increase the interactions with the teacher, favouring the attainment of the main aims at the basis of the constructivist model. According to the IQ system, the learner has moreover at his/her disposal various access modalities to the IQ catalog, according to the following dimensions: time dimension, semantics dimension, IQ pushing dimension. flat-access dimension. Finally, in the application, the teacher's possibility of communication in direct chat from the video-lesson web page has been anticipated, that happens automatically following the activation on the part of the teacher.

1 Introduction

In the course of time Distance Education has gone through different phases or modalities: from distance learning in which the logistic aspect (remote) of the didactic contents distribution was emphasized until the present online learning or Web learning, where hypermedia and the Web have a crucial role (Trentin, 1998).

According to us, an e-learning system can be considered as an informative system in which different didactic contents are inserted and classified. During the last years, the Informative Systems are more and more oriented to the Web, to the advantage of the data heritage management that becomes richer and richer and able to reach a major number of users (Atzeni, 1999). This is what is today defined WIS - Web based Information System - that is, informative systems the implementation and management of which happen through the use of Web technology, for the information diffusion and sharing inside much wider communities than the traditional ones (Kambil, 1998).

From these considerations, we think that in an e-learning process a WIS can be considered a tool able to improve the management, diffusion and sharing of the learning objects, directly usable and with a remarkable simplicity through the use of a normal browser, from which we use the paradigm of WIS-learning.

In the present work, we want to point out the development of a system that goes beyond the classical tools now present in a web-learning, that is able to enrich the information sharing between the students and to increase the interaction with the teacher; dimensions moreover widely accepted by the constructivism that assigns great importance to the dialogue between teachers/researchers and students, between teachers and students, since knowledge has social origins and can develop itself only in a condition of dialogue, cooperation and interpersonal communication (Piu, 2001).

Following the didactic paradigm of the WIS-learning, our aim is to show how any multimedia and non-multimedia object constitutes an informative element that, upon an opportune form of approval, enriches the system knowledge base, offering at the same time wide margins of interactivity, re-use and extension. In particular, a tool called *Indexed-Questions* (IQ) will be described later on, that allows a better management of the multimedia data inside a system oriented to the e-learning, considering that this very last point represents one of the major difficulties which we meet to encourage higher and higher interactivity levels. The proposed solution is therefore based on the use of the *Indexed-Questions* (IQ), through which we obtain a form of more advanced hypermediality, based on a mechanism of dynamic indexing, directed towards the decomposition and the detailed analysis of the contents, such as multimedia

ones, that in other contexts are exclusively used in preordered forms and that cannot be modified or decomposed (use of the entire video).

Thus, a new didactic learning model is configured, that re-discovers the value of the dialectics, the interpersonal topic and the research of the meaning and assigns an important role to the context, to the interactive and social dimension in the communication directed towards learning; that is why it requires an active involvement from the part of the students, considered able to build in an autonomous way their knowledge and skills. Knowledge becomes the product of an active building of the subject (and not something that can be already found prefabricated) and derives from the relationship between the community members that we belong to through forms of negotiation and social collaboration (Piu, 2005). The IQ effectively represent an interesting support tool to the interactivity between the members of the w-community (Isakowitz, 1998), to the extension and to the sharing of the system knowledge base and finally to the creation of auto-learning paths.

2 WIS-learning

The informative systems, thanks to the Web technology, are going through a radical and deep change and they are more and more transforming in WIS – Web-based Information System – that represent by now a new generation of the traditional informative systems and are object of study of numerous researchers. The WIS are considered an effective tool for the knowledge representation and applied to the context of the education, they can configure an ideal environment for learning, leading to a complete management of the didactic contents (Isakowitz, 1998).

That is how WIS becomes WIS learning, which enlarges the knowledge diffusion channels inside an increasing number of learners, raising the interaction levels among the actors involved in the learning process, with all the deriving advantages.

A WIS implementation however requires a series of phases that have to be opportunely estimated: from the analysis of the technological infrastructure on which the entire system is based, to the processes management for the knowledge and not simply for the information diffusion. The system strengths, must be more and more oriented to the achievement of high levels of interactivity, multimediality and collaborative learning. The WIS oriented to the e-learning, in our opinion, represent an effective support to a new learning form and offer an adequate answer to these requirements, since the type of manageable information is various: in fact, it can deal with textual, multimedia information at the difference of the traditional systems where the data are strongly structured.

In alternative to a traditional approach of instruction, where the heart of

the didactic activity is represented by the teacher, the WIS-learning, following the constructivist model constitutes a new theoretical framework of pedagogic reference which sees the subject, pushed by his/her own interests and located in a specific educative context, to learn through a process of elaboration and integration of multiple perspectives, information and experiences, offered either by a series of communication tools that enrich the educational offer, or by the confrontation and the collaboration with the peers or with the experts group, represented by the teachers (Piu, 2005).

As a consequence, it is clear that the elements involved inside a similar system are a lot and complex enough, aWIS oriented to the e-learning manages a series of activities that go from the management of the student identity to the final distribution of the contents present in the one that we can define “knowledge library”. As regards the traditional informative systems, the documents storing and retrieving is guaranteed in multimedia and hypermedia format; moreover the adoption of strategies and tools that regulate the interaction between the users who have access to the system are required, so as to obtain a form of shared knowledge that is acquired in a dynamic and progressive way by the system through the interactions registration (FAQ, chat session, free upload space, etc.) among the actors involved in the learning process, adding itself in a complementary way to the basic contents inserted by the teaching team (Calvani, 1999). It seems obvious that, with regard to the latter aspect, the problem that occurs is certainly the creation of forms of filter that reduce in a major way the “informative noise” introduced by the fact that forms of the equal free communication (chat, forum etc.) weighs on the documentary content of the e-learning system, introducing wrong information. On the one hand, forms of mediated insertion that see, for instance, the intervention and elaboration of the contents from the part of a content manager before carrying out the storing in the platform and on the other hand, of tools such as the search engines, that facilitate the selective retrieving operation of the data certainly fall in this category.

In the present work, we intend to analyze the approach that has to be followed for the management of multimedia data inside a Wis-oriented to the e-learning, having in mind that this last aspect constitutes the element of a major difficulty in the development of an integrated system in the treatment of heterogeneous data that offer an effective support to the interactivity as well.

The Indexed-Questions system, that will be described in the course of the article, has the role to emphasize these modalities again in parts overcome by now, in which the interaction teacher-learner was exclusively guaranteed from the activities carried out by the tutors inside the class. Moreover, the same system proposes to encourage the achievement of the main goals at the basis of the constructivist model, first the collaborative learning and the just-

in-time learning, in which the learner assumes more and more an active role and participates him/herself to the building of the learning process. In fact, this allows the realization of a more effective W-learning environment, that has the aim to improve the didactics quality in FaD modality (Galliani, 1999, 2004). Therefore, questioning the management of this interactivity to specific tools, anyway supported by the presence of the team that follows the correct explanation, it is possible to reach a decisively bigger number of users and a certainly more effective interactivity level. The system of the IQ that we are going to illustrate, represents a significant example of how to implement forms of data management and interaction that regulate contents communication and elaboration in a WIS oriented to the e-learning.

3 The Indexed Questions system integrated in the tool of the “indexed lesson”

The distribution of the recorded lesson service has always been an element that has seen its remarkable communicative potentialities a little emphasized. Its asynchronic and asymmetrical nature, united to the difficulty to manage highly structured and complex contents such as an audio-video-data flux, has strongly limited the integration with the other parts of the traditional e-learning systems: in many cases, the video on-demand has been seen as an independent service, with its natural peculiarity, to be used with particular modalities, with the absence not only of interaction in the communicative part, but also of a modulation oriented to the decomposability regarding its structural part. Therefore, we attended a remarkable dyscrasia between, on the one hand the entire of HTML embedded contents, characterized by a remarkable flexibility for the aspects linked to the decomposition (see, for instance, forms as the Cut and Paste and the Save Object As), the indexing (anchorage, hyperlinks) and the research (search engines) and, on the other hand, the services of video-conference and video streaming. In the last periods, nevertheless, the introduction of technological supports that make the multimedia HTML fluxes embedded and indexable, allows to overcome a lot of problems that we have listed.

The leading idea that we propose to use is fairly simple: to insert a control for the use of the streaming of the recorded lesson in a web page and accompany it of a series of indexes that allow a quick and effective browsing among the contents proposed in the video, without the necessity to have to follow the whole lesson, from the beginning to the end, to be able to extract the interest contents. In front of an analysis effort in the content insertion phase, through which we provide for supplying an indexing of the video, we can insert the recorded lesson inside a hypermedia context and above all from the structural point of view (putting it in a web page environment), but also and above all

to the one of the communicative paradigm (a series of hyperlinks can aim at the video, allowing the surfing through it in a similar way to what happens for the hyper textual links and for the anchorages). The tool we have just illustrated assumes the name of indexed lesson and can be considered in a last analysis as a way to join data (in an audiovisual form) and meta-information that characterizes the content, allowing research and selection inside this latter (De Pietro, De Rose, 2003).

Apart from opening new and stimulating perspectives for the development forms of hypermedia communication inside the WIS oriented to the e-learning, the indexed lesson also introduces a series of management and implementation problems that will be faced and solved in the present work, to be able to supply to the learner an effective tool to the support of the learning process.

In figure 1, the interface of the indexed lesson integrated with the Indexed Questions (IQ) tool.

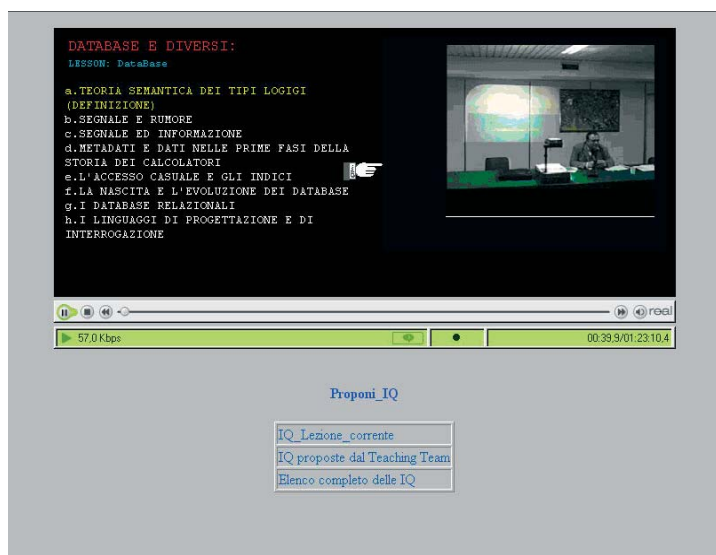


Fig 1 Interface of the Indexed Questions tool

The web page that allows the use of the video-lesson is divided in some “regions”, each one of which recalls the relative audio-video components, the text, the images and all the other elements necessary for the interaction with the video. On the left hand of the page, the title of the lesson is visualized with the relative subtitles and the supervisor (teacher) of the lesson; under the title, however, the Index through which it is possible to “surf in the video” is recalled and visualized, intending with this new term the possibility of pointing at the film by “bits”; this index will allow the learner to view directly the part of

the lesson that interests him/her. In the right hand of the page, the lesson that will be used is visualized by the learner in a different way from a traditional video; in fact, the student has the possibility to carry out various operations on the lesson itself, and becomes “director” of the video, thanks to the possibility to interact by means of some buttons (control tools) that are integrated in the same interface.

An aspect of remarkable importance is represented by the fact that the video during the sliding phase becomes clickable in some time intervals defined a priori, warned by the apparition of an icon, with the possibility of linking to other resources as url, text files, power point slides, images etc. contained in the database of the didactic platform, that can serve for the explanation and/or deepening of the transmitted concepts. Specifically, in fact, the reference to the external resources are not only addressed to simple files, but rather a perfect integration with the didactic homepage is realised, and in particular an interaction with other communication tools as the forum and chat is activated, so as to exploit the potentialities of all the communicative tools at disposal, either asynchronous or synchronic.

Later on, to improve these tools integration in the application, the teacher has the possibility of notice in chat by means of the visualisation of an icon in the page frame, that will allow the direct link to the chat following the teacher activation from his own administration interface.

The video streaming is by definition an asynchronous and asymmetrical tool, so in its basic form does not provide for any form of interactivity from the part of the learner. Nevertheless, in our opinion, this represents a strong limiting factor of the great potentialities that hypermedia technologies can express to diffuse contents, for this reason, we found it profitable to invent a tool that, even maintaining the typical asynchronous nature of the service, allows the learner to interact actively, proposing his/her queries, observations, answers and doubts; these requests, examined by the teaching team and by those accompanied by opportune observations and answers, are added to the video lesson as a clarifying and deepening complement to the contents of the latter. This result is very important because it implements the notion of shared knowledge born from the users’ interaction from an original document base; the teaching team intervention has the role of entrance filter to possible “informative noise” that the learners can introduce.

What we have just presented, it is a proof of the fact that in a Web-based, e-learning oriented informative system, the presence of tools that not only support and approve the data management of heterogeneous and multimedia data, but that regulate and organize the informative and communicative fluxes also between the various parts of the system and among the actors involved by them is essential (Maragliano, 1997).

The query's formulation online from the part of the student perfectly integrates itself in the exploitation mechanism of the indexed lesson object of the previous work (De Pietro, De Rose, 2003). The question/observation is attached to an index that directly aims at the part of the lesson to which it refers; the name of Indexed Questions or I-Questions exactly derives from this particular characteristic.

During the exploitation of the recorded lesson that can happen according to the three following modalities: forward-only, random-access, indexed-access, the learner through an appropriate button placed in a second frame, starts the automatic building of a video pointer, composed by the url of this latter and the value assumed by the timer of the video-streaming when the click on the button is carried out. In a text-area, the student can write his/her queries and/or observations, and finally, with the submission button, sends the IQ to the teaching team examination. In a third frame of the page, the IQ accompanied by the relative answers are then proposed.

4 Access and consultation of the IQ

From the point of view of the student, there are four modalities of access to the catalogue of the IQ, following the ones we could define four classification dimensions:

- the time dimension;
- the semantics dimension;
- the pushing IQ dimension;
- the random access (flat-access) dimension.

The time dimension: the learner, during the exploitation of the streaming video, making a simple click can visualize, in a pop-up window, the list of IQ that refer to the part of the lesson; the selection criterion of the IQ is based in this case on the indexed subdivision of the lesson made by the teaching team, in particular all the indexed questions that fall on the indexed part that the student is visualizing in a given moment are extracted. This choice is based on the simple and fairly intuitive assumption that the questions/observations asked while the teacher is dealing with a particular topic, are substantially correlated to this latter.

The semantics dimension finds the extraction on the classical mechanism of the search engines; having correlated the audiovisual part with appropriate meta-information (title, abstract, etc.), we can therefore avail ourselves of the usual research strategies based on the textual analysis, that are essentially founded on the correspondence between the researched words and the present words in the text of the documents.

The pushing dimension IQ provides for, as we can understand from its

name, a more significant pushing form of the IQ from the part of the teaching team towards the students. What happens is therefore the proposition of a list of indexed question that, from the part of the teacher are considered particularly significant and consequently worthy of particular attention from the part of the W-community. The mechanism that attributes the degree of importance is essentially based on an evaluation that is operated by the teaching team and can be implemented in two different ways: through a score that, inserted as an further attribute of the IQ, indicates the importance of this latter on a value scale pre-ordered and fixed a priori; through a direct selection of the more significant IQ proposed by the teaching team going from the entire set of questions. This second strategy presents however the limit to require a continuous human intervention to be updated, on the other hand the first mechanism, although it works totally automatically providing for the visualisation of the IQ in order of the decreasing score, could present at long-term some imperfections since, at the increasing of the number of IQ, the teaching team could need to see again the previously attributed score values. By virtue of what we have just said, to solve these problems, we could adopt a strategy that is a hybrid between the two approaches: letting unchanged the hierarchy of the importance introduced in the score, we can allow the teaching team to be able to give or to remove, at any moment, a particular bonus score that confers a maximum importance to the IQ that are connoted by them. Operating in this way, we can dynamically intervene to modify the first positions in the order of importance of the questions.

The flat dimension finally allows the student to have access to the complete list of the IQ, running through the whole list of titles and abstracts to work on his/her selection.

5 Conclusion

Going from the notion of informative system based on the Web, we analyzed some problems relative to the management of multimedia data inserted in a context such as the WIS oriented to the e-learning. In particular, we have shown the implementation of a system of video on-demand, called “indexed lesson”, that extends the traditional systems of video retrieving to the light of the WIS-learning paradigm. The hypermediality is the most advanced result because from the mechanism of dynamic indexing and from the possibilities of memory recall of the considerable just in time multimedia contents thesaurized, we arrive to a discreet use with the same “spontaneity” of the mere television media, while we use a lot the analytic power of the digital in a highly complex system, as required by the multiplicity of the distance didactics. Then, the interactivity between the members of the w-community, the extension and the sharing of the system knowledge base, and finally the creation of auto-learning

paths transform our passive habit to the television in the first real experience of interactive television in a context of high university teaching.

The didactic and pedagogic consequences are remarkable and are first met in the same concept of education, intended as internalization of a learning methodology that aims at progressively rendering the autonomous subject in his/her own cognitive processes, since they recognize the strategic role of metacognition and facilitate the awareness and the comprehension, in the subject, of his/her own cognitive processes. The second positive element concerns the way in which we learn, that sees theory and practice move in synergy towards a significant learning, contextualized and situated. Besides, the proposed system ensures a strong dialogue basis, founded on shared speeches, common knowledge, negotiated meanings and definitions; recognize and save, giving them legitimacy, to the differences, through the indifferent access to the system and to the didactic practices. The third consideration emphasizes the possibility of a flexible and fluid organization, from the moment that we can provide for a positive exchange of the roles between the various involved actors and requires: collective responsibility, mutual respect and esteem, but also a sense of personal identity and belonging of a group. Moreover, moments of cognitive scaffolding are scheduled (guide, support, problem, reinforcement, critics about the actions) and emotional (motivation, empathy, call for attention) (Piu, Paparella, 2005).

In summary, in this new proposed model, the role from the part of each student is emphasized:

- active because aware and responsible;
- constructive because the subject integrates the new knowledge with the previous ones;
- collaborative because the subject works in a constructivist community (scaffolding offered by each actor);
- intentional because the subject is really involved in the achievement of the known and shared goals;
- conversational because the dimension and the category of the learning dialogue is strong and is ensured through the confrontation, the discussion and the negotiation of the meanings;
- contextualized because the tasks assume significances in the real word;
- thoughtful because the subject reflects on the processes and the decisions and therefore the pedagogic and didactic category of thoughtfulness.

The proposed model is centered on the students, on their needs and on their resources, for the activity is thought as a tool of guarantee of the right to the diversity rather than equality.

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