

# Design of an automatic answering tool for e-learning environment

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**Abstract :** This work constitutes a new component to be incorporated in e-learning environments. Its objective is to answer automatically the students by exploiting cumulated experiences in past e-learning' sessions. For instance, this tool will be added to the system we are developing since several years that we have called PERSO. The main objectives of PERSO is to introduce intelligence into e-learning environments by automating a set of its features (e-mail return, student profile determination, dynamic course generation, online assessment and generation of course material at the student level,...)

**Keywords :** e-learning environment, automatic answering, latent semantic analysis, intelligent tutor.

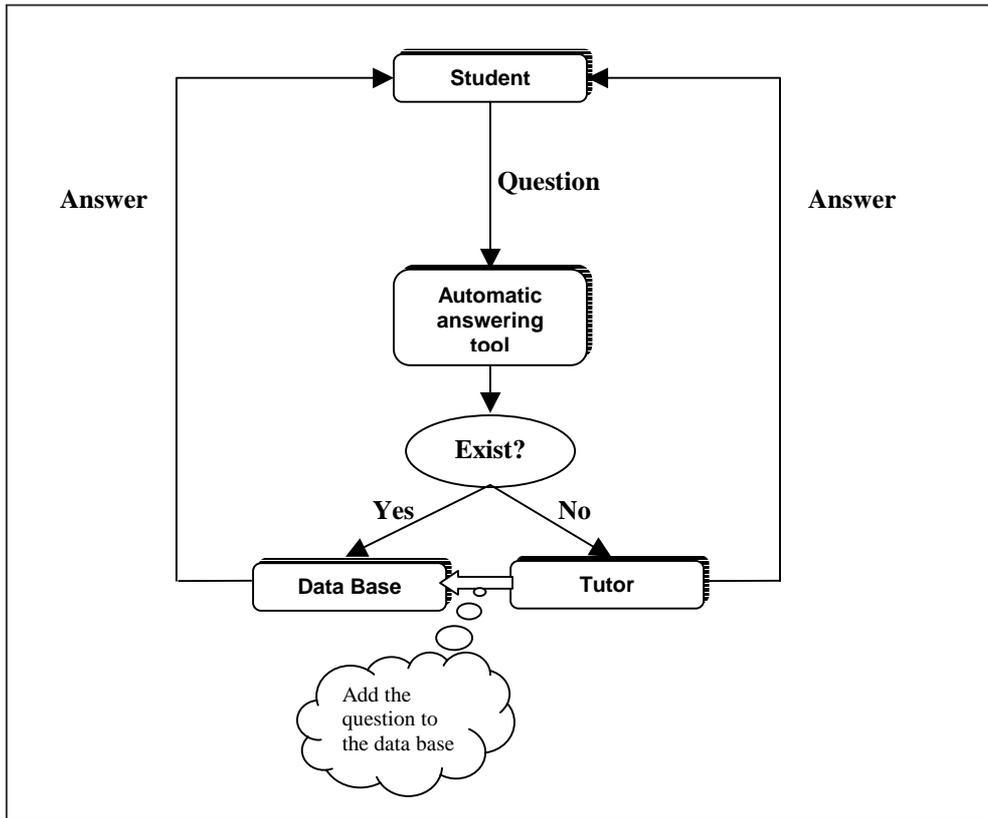
**1. Introduction :** The goal of PERSO is to design and develop an adaptive hypermedia e-learning system, where learners with different learning goals are treated differently, by building a model of knowledge and preferences about each of them. This model is used to generate automatically a personalized course fitting the needs of each learner.

PERSO is mainly based on the elaboration of dynamic questionnaire's generator to model the student background regarding the subject to be taught. It uses an open approach where the student answers the system question with a free verbal statement. The system performs an analysis of the student answer by calculating its semantic closeness to the correct answer, previously stored in the system.

PERSO is based on a course generator. The user model developed next to the questionnaire is used to generate automatically an appropriate training content for each student. In order to build a new course, PERSO tries to exploit previous experimentations and solutions when creating a new personalized course by the use of a case based reasoning approach.

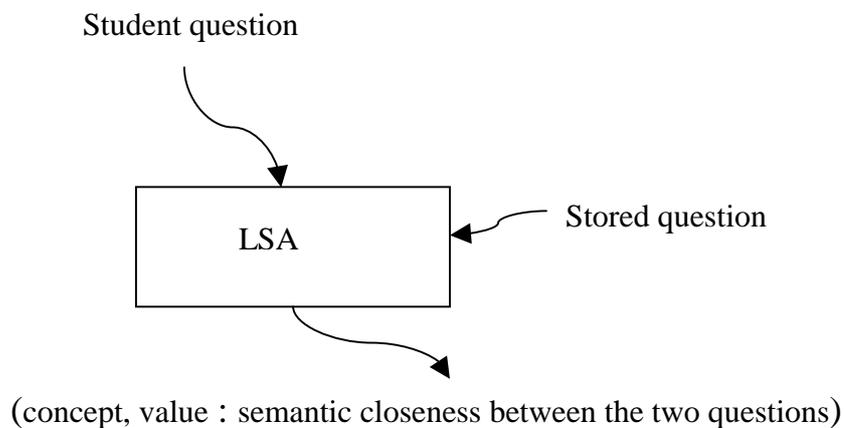
**2. The automatic answering tool:** the aim of this tool is to reduce lecturers' work load and to give an immediate answer to the student (when possible) by exploring the cumulative experiences from previous students' answers for the benefit of new ones. It is well known that in every learning session of a given course, students may ask the same questions and that tutors (who may be different) may answer the same answers. Our approach consists of storing questions/answers (with the permission of the tutor) in a data base. If any e-mail's similarity occurs regarding asked and/or answered questions, the tool tries to search for this information in the data base and answers automatically the student by giving him the stored data. Otherwise, the question will be submitted to the tutor.

The functioning of the tool is summarized in the following figure.



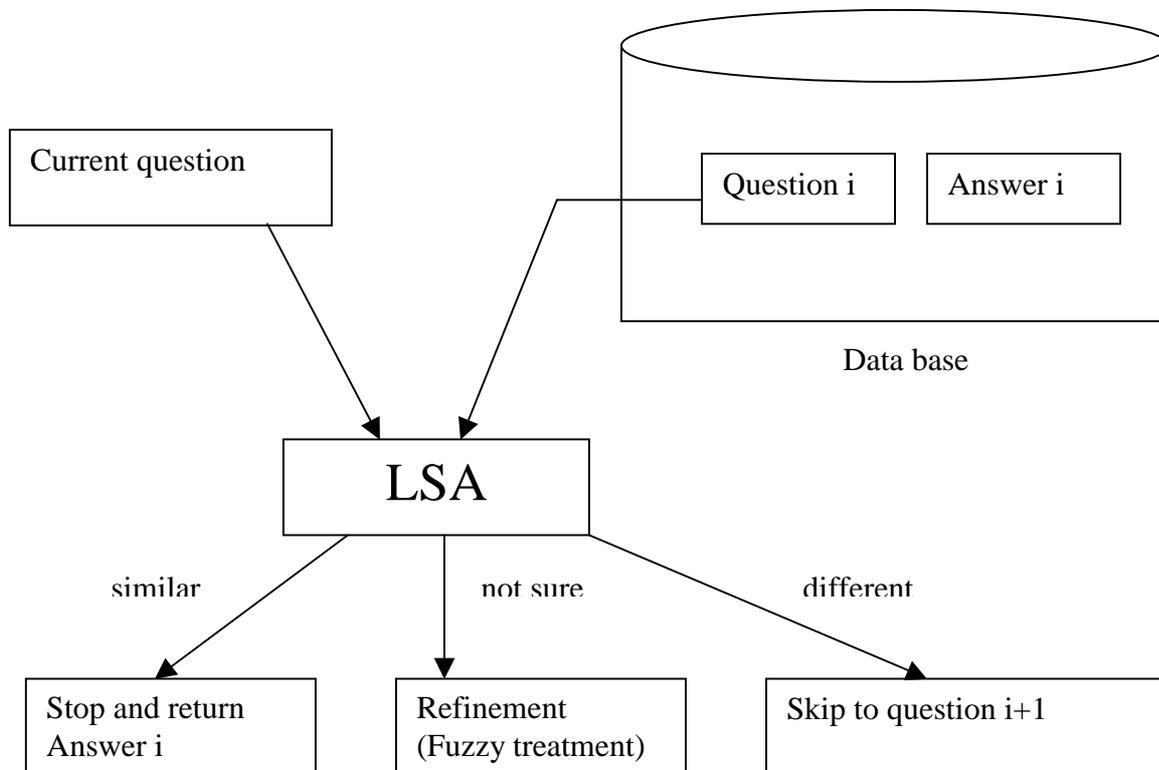
**Fig.1 - Functioning of the answering tool**

A key step of the approach consists on the semantic analysis of questions. This analysis consists of calculating the semantic closeness between the current student's question and previous questions saved in the data base. The semantic closeness is calculated by use of a powerful techniques named Latent Semantic Analysis (LSA) (Landauer, Foltz & Laham, 1998) as described in figures 2 and 3.



**Fig.2 -Latent Semantic Analysis**

The treatment of the question depends on the semantic closeness value returned by LSA as described in figure 3.



**Fig.3 -Treatment of the student's question**

When the analyzer do not found exactly the same question saved in the data base, the system uses other techniques. It proceeds to a refinement treatment of the collected questions when LSA could not give an accurate decision. This treatment uses the meta data introduced by the tutors who have saved the questions and their answers. Every saved question has been answered only one time when it first has been asked. In this case, the tool reacts in semi-automatic way. It may interact with the student by considering his opinion.

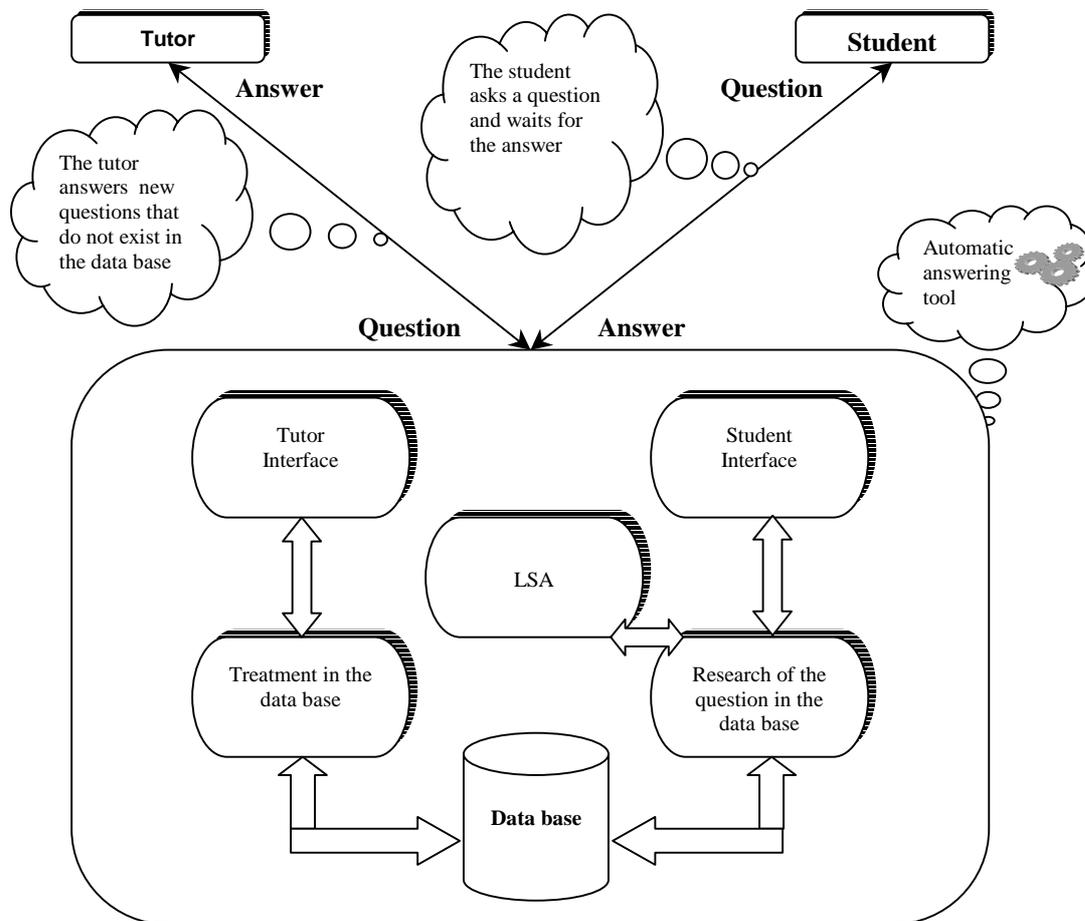
To give more insight on the system's work, we can identify two different phases:

- 1- Alimentation phase: during this phase, the data base will be alimented by questions/answers under the total control of the tutors. A tutor may decide or deny to save the selected questions and their answers with an appropriate interface (figure 4).
- 2- Exploiting phase: it consists of answering automatically or semi automatically the student by using the previously stored data.

### 3. Conclusion

A prototype of the answering tool is currently under development. It is based on open source software i.e. My Sql database, tomcat web server, JSP code and Linux operating system. We

plan in the future to integrate it in the system PERSO in order to experiment and evaluate it before making it available at the internet for free use.



**Fig.4 –General architecture of the answering tool**

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