CHAPTER-1

eLEARNING IN ALGERIA
Experiences On E-Learning in Algerian Universities

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ABSTRACT

Learning requirements are increasing in Algeria because of population explosion and the policy of democratization of education. An estimated several thousand teachers in the deficit for the coming years in Algerian universities. If you look at training trainers who is supposed to take over shows that the number of positions available each year is still below that required to meet the demands of coaching in Algerian universities. Despite almost annual opening of new universities, overload students remains a problem for managers of these establishments. Add to this the insufficiency of teachers in some specialties where demand is high and spread over the vast territory of Algeria. E-learning presents an alternative then the more it brings benefits in terms of educational and economic consequences. Indeed with the e-learning problems of housing, food and transportation for students will no longer arise. Secondly Algeria can not afford to remain on the margins of technological innovations.

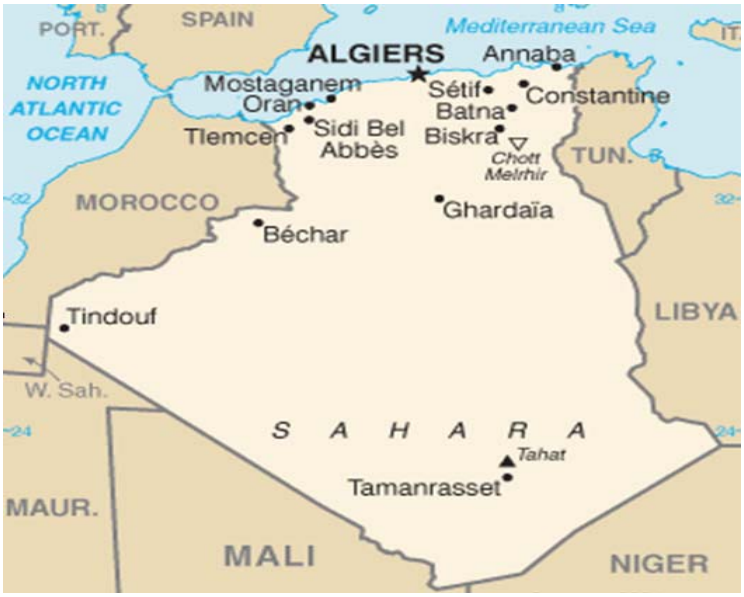
COUNTRY

Algeria (People's Democratic Republic of Algeria) is located in north-western Africa, bordering the Mediterranean Sea between Morocco and Tunisia. Algeria has an area of almost 2.4 million square kilometers, more than four-fifths of which is desert. Algeria is the tenth largest country in the world and the second largest in Africa (after Sudan). Algeria shares borders with Morocco, Mali, Libya, Tunisia, Niger, Mauritania, and Western Sahara. Algeria's northern border stretches along the southern edge of the Mediterranean Sea from Tunisia in the east to Morocco in the west (Elabweb, 2009). (See figure 1.)

As of July 2009, Algeria's population was estimated to total 34.2 million. The population was growing at an annual rate of 1.2 percent. More than 90 percent of the country's population is concentrated along the Mediterranean coast, which constitutes only 12 percent of the country's land area. Therefore, the overall population density of 14.2 people per square kilometer is deceptive. About 59 percent of Algeria's population is urban. Drought conditions have led to an internal migration of farmers and herdsmen to the cities to seek other employment. High unemployment encourages emigration. In 2009 Algeria's net migration rate was estimated at –0.29 migrants per 1,000 people.

In 2009 population distribution by age was as follows: 0–14 years, 25.4 percent; 15–64 years, 69.5 percent; and 65 years and older, 5.1 percent. As this distribution indicates, Algeria has a very young population, which poses a challenge for the labour market and the education system. According to the World Health Organization, life expectancy in 2009 was 74.02 years (72.35 years for men and 75.77 years for women).

Figure 1.
A map of Algeria



Source: CIA 2009

In 2009 the birth rate was estimated at 16.9 per 1,000 people, and the death rate was estimated at 4.64 per 1,000 people. The infant mortality rate was 28.78 per 1,000 live births, and the fertility rate was 1.86 children born per woman. The official language is Arabic. French is the language of business, and Tamazight is also spoken (CIA, 2009). (Elabweb, 2009)

HIGHER EDUCATION

Higher education is provided by universities, specialized institutes, national institutes of higher education, and teacher training institutes, which fall under the responsibility of the Ministry of Higher Education and Scientific Research, as well as by institutes run by other ministries. The specific degrees awarded are determined by the field of study, not the institution. The Ministry of Higher Education approves the curriculum, which is standardized for each field of study. Universities in Algeria have gone through a reform of bringing the composition of degrees into accordance with international standard called LMD: 3 years bachelor (Licence), 2 years Master and 3 years Doctorate.

It is hoped that the new system will make program offerings from Algerian universities more compatible with those around the world, thereby increasing the international mobility of Algerian faculty and students. In addition, the reforms are aimed at increasing student flexibility in choosing and transferring courses and credits; making the system more efficient as relates to the time it takes for students to graduate; increasing lifelong learning opportunities; and increasing institutional autonomy while producing learning outcomes more attuned to the needs of the labour market.

Educational reform has focused on teacher training, reforming curricula and general reorganization of the sector. It has strengthened initial training for new teachers and set up a national training and refresher programme for working teachers and a range of measures to improve their status. Curricula have been revised, notably for language teaching, textbook content and the criteria used for choosing between the different disciplines. Science has been emphasized and Information and Communication Technologies (ICT) is being introduced as a teaching tool and a means of access to knowledge. Algeria has 34 universities, 12 university centers, and 21 high schools (CIA 2009; Elabweb 2009; Attieh, 2003; Hamdy 2007).

Educational research has received considerable support from the Algerian government. The MHESR directs much of the research and oversees formal

agreements of collaboration with the individual universities and other higher education establishments to develop and carry out projects. Some research units deal with pedagogy, curricular material and textbook development, teacher and faculty training, supervision, and testing and evaluation for the purpose of improving the efficacy of internal structures and practices. However, the government's support of research activities appears more rhetorical than substantive when one examines faculty participation in research. Despite the ministry's emphasis on the significance of research for faculty rank, salary promotion, and development, it has adopted the long-time practice of automatic faculty promotion based on years of service, thus fostering apathy and disregard for the importance of research. Algeria has been producing students without any, or with meager, research skills, even though the country remains in dire need of academic, empirical and scientific experimentation to revitalize its weak domestic industry, improve productivity, and match its strong economic performance of the 1970s (Aman Attieh, 2003), (UNESCO, 2004),.

Webometrics (Webometrics, 2009) places Algerian universities low in world rankings, University of Sidi Belabbes comes out national best, no. 4116 in the world, with University of Tlemcen, Tlemcen national second, being no. 4143 in the world (see Table 1).

ICT IN ALGERIA

In Algeria, the integration of ICT at the level of the university is relatively recent. Therefore, there's certain awkwardness in handling this new issue. The double problem which emerges is: First, the training of trainers as to their aptitude to handle the new technologies and adopt the adequate pedagogies. Second, the question of the readiness of the Algerian learners: to what extent are they ready and able to adopt new learning strategies involving the use of computer and internet?

ICT Policy

The implementation and management of Algerian national ICT policy has been mandated to the Ministry of Posts, Information Technology and Communications (MPTIC). The first important policy drafted was in 2000 with the creation of the regulatory authority for post and telecommunications (ARPT), and the split of Algeria Posts and Telecommunications into two companies, one of them becoming the incumbent telecom operator Algeria Telecom (AT). The ARPT is in charge of regulating postal services and the telecommunications sector. This includes promoting competition in the latter.

It is also responsible for the procedures for the allocation of operating licences and defines the rules on pricing for the services provided to the public. It ensures that the licence conditions are implemented and that the telecommunications infrastructure is shared. In 2005, the MPTIC was assisted by a United States of America (USA)-funded project, the Internews

Table 1.
Algerian Universities in African Top 100 (Elabweb 2009)

Algerian Rank	African Rank	UNIVERSITIES	World Rank
1	23	University of Sidi Belabbes	4,116
2	24	University of Tlemcen	4,143
3	47	University of Batna	5,548
4	62	University of Constantine	6,766
5	65	University Houari Boumediene	7,008
6	70	University of Mostaganem	7,205
7	76	University of Algiers	7,849
8	86	University of Bejaia	8,376
9	91	University of Boumerdes	8,727
10	96	ESI School (ex INI)	8.960
11	98	University USTO Oran	9,004

Network Global Internet Policy Initiative (GIPI). This project aimed to assist policy and regulatory actions needed to address the identified constraints on access to and use of the internet in Algeria..

At that time, the MPTIC and ARPT had been focusing on important policy and regulatory decisions aimed at liberalising the telecommunications sector in order to expand internet access.

In addition to the MPTIC and ARPT, the Ministry of Higher Education has also played an important role in the ICT field, especially through the Scientific and Technical Information Research Centre (CERIST), which functioned as the only internet service provider (ISP) before market liberalisation (UNESCO, 2004), (World Bank, 2007).

Internet

Algeria first gained Internet connectivity in 1994 under the auspices of the CERIST, which by law remained the country's sole ISP until 1998. On August 5, 1998, decree no. 98-257 opened Internet service provision to other providers, but private entry into the market proceeded slowly.

Two years later, law no. 2000-03 created the MPTIC, which included the Internet regulatory agency Algeria Telecom. Algeria Telecom launched the ISP Djaweb in 2001 to extend service beyond universities and research centers.

Today, Algeria Telecom lists twenty-six ISP partners operating in the country, including CERIST. CERIST continues to develop the academic, non commercial Internet under the influence of the state and has created nodes in Algiers, Oran, Constantine, and Ouargla.

The MPTIC has expressed its desire to promote the Internet as a source of investment and job creation.18 Though Internet penetration has increased dramatically over the past few years, jumping from approximately 1,500 in 1999 to nearly 850,000 in 2006, this still represents only 2.6 percent of the population.

The government has supported programs that allow users to access the Internet on a "pay-as-you-go" basis, without requiring a monthly subscription. Although most ISPs offer broadband, ADSL, or satellite plans, the prices of these services remain prohibitively high for many Algerians.

Consequently, most Algerian Internet users rely on dialup connections and cybercafés for access (Elabweb 2009 & World Bank, 2007).

ICT INIATIVES FOR ELEARING:

University of Continuing Education

Algerian University of Continuing Education (UFC) was established in May of 1990. The structure of UFC includes a master dean or rector, a vice rector in charge of pedagogy, a vice rector in charge of communications, a computer science center and an administrator. UFC operates 10 learning centers in the central region of Algeria, 13 in the western region, 16 in the eastern region, and 14 in the southern region. UFC has four guiding missions:

- to prepare senior high school students for the national university entrance exams;
- to provide undergraduate evening studies for high school graduate;
- to offer courses for university graduate students providing them with modern tools for the new economy; and
- to offer specialized courses for professional continuous education. UFC students can follow studies in technical languages, science, business, and management.

Courses are also taught in the fields of computer science, electronics, biological analysis and industrial chemistry. In addition, there is a specialization in the field of education.

During the academic year 2001/2002, UFC had 56, 842 students, of which 8,236 were studying via distance education.

During that time period, the university had 2400 lecturers, of which 12% had doctorate degrees, 68% masters degrees, and 20% undergraduate degrees.

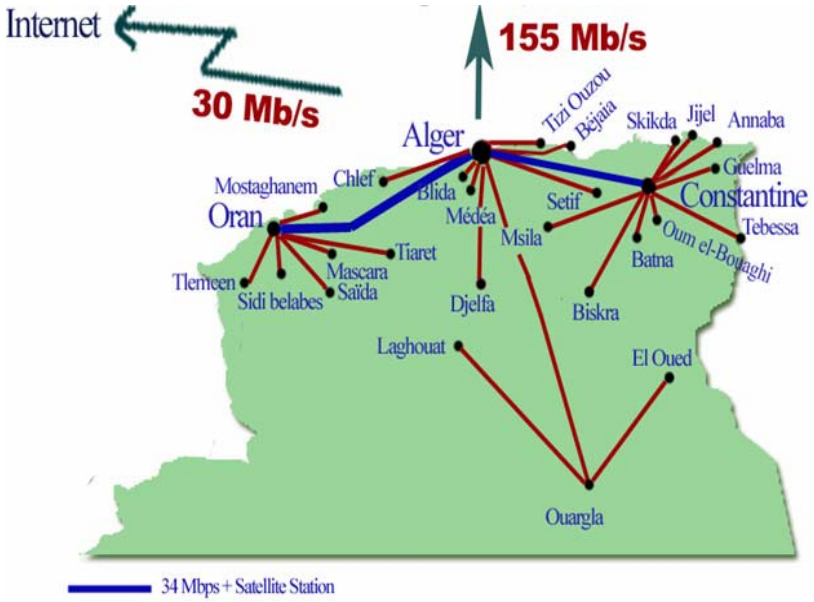
UFC has many foreign partners in the distance education work it undertakes. These partners include; Group A6 (France); the National Center of Distance Education (France); M. I. T. (USA); ROBOTEL (Canada); the Open University El Quods (Jordan); the University of Jean Moulin (France); and the Avicenna Virtual University (Djoudi, 2009).

Academic and Research Network

The Algerian Academic and Research Network (ARN) is a national project financed by the government of Algeria. The project has been initiated in 1994. The network is being set up by the CERIST on three phases:

- Selection and connection of regional nodes: this phase consists in defining POPs (point of Presence) in each region of the country, connecting these points through communication lines, buying and installing routing and server equipment.
- Connection of regional centers and universities to the POPs: this phase consists in selecting research and academic institutions in each region and connecting them to the regional node.
- Connection of the regional nodes to the main central node which is connected to international networks and development of services and information servers.

Figure 2.
Academic and Research Network



ARN connects all the established universities and research centers. This network includes 25 universities, 10 university centers, 11 high institutes and engineering schools, 12 research centers, 11 others scientific institutions (See figure 2).

Ousratic

Within the framework of the process of building the Algerian information society and of the recommendations of the e-Commission, chaired by the Chief of the Government and installed in Apri12004, the Minister of Post and Information and Communication Technologies announced operation OUSRATIC in July 2005. OUSRATIC plays on the terms 'ousra', meaning 'family' and 'TIC', an acronym for information and communication technologies (ICT). Together, they form the word 'Ousratic', which translates to 'your family.' The stated aim of operation OUSRATIC is 'one PC per household.' The Ousratic initiative aims to increase the penetration of computers in households by offering people loans for their purchase. The government has also lowered the value added tax (VAT) on computers from 17% to 7%. Operation OUSRATIC consists of putting on the market five million PCs between the end of 2005 and 2010, which makes a total of one million PCs per year. The new market created by this project will have a

value of more than USD 4 billion. Each family will be able to buy a PC thanks to the conditions put in place. Nine million schoolboys, high-school pupils and students will take part in shaping the success of this operation and the good use of PCs (World Bank, 2007).

E-Algeria 2013

The MPTIC ministry recently revealed a new strategic plan for developing ICTs in the country. The e-Algeria 2013 initiative is supposed to accelerate ICT use in the country, including the government's application of technology to increase access to government information. This strategy is the result of the deliberations of a so-called "e-committee" headed by President of the republic. It follows the rapid growth of mobile telecommunication services in Algeria, but not internet and broadband services.

The E-Algeria strategy is based on several goals: boosting the use of ICTs in public administration and businesses; developing incentive mechanisms and measures to give citizens access to ICT equipment and networks; stimulating the development of the digital economy; strengthening high and very high speed telecommunication infrastructure; developing human capacities; strengthening research, development and innovation; updating the national legal framework; recognising the value of international cooperation; and establishing e-monitoring and evaluation mechanisms (Djoudi, 2009).

INTERNATIONAL PROJECTS

The exponential development of increasingly sophisticated communication technologies has prompted universities, companies and educational institutions to experiment with alternatives to the traditional teaching methods, thereby leading to the development of online courses. However, there are also new opportunities to be seized for learner participation in the creative process. At present, Information and Communication Technologies mediating learning represent an important component of education and training systems. Over the last two decades, concerted efforts have been made in the area of distance higher education in Algeria. These endeavours can be classified into three modes: Distance or open education programs provided by traditional higher education institutions, distance or open education institutions, and a virtual university (Mahieddine Djoudi, 2009).

Avicenna Virtual Campus

Avicenna was launched by UNESCO in November 2002 with funding from the European Commission through its Euro-Mediterranean Information

Society (EUMEDIS) programme. It is aimed at creating a self-sustainable virtual campus, based on cooperation between institutions of the member countries (Spain, UK, France, Italy, Turkey, Cyprus, Lebanon, Syria, Jordan, Palestine, Egypt, Malta, Tunisia, Algeria, and Morocco).

The Euro-Mediterranean partnership is to reinforce the cross-fertilization of expertise and innovation in the field of distance education and training. The campus is also aimed at concentrating on course development, by using ICT to produce, deliver and exchange courses, bearing in mind the necessity to develop curricula in an innovative and multilingual way within a multicultural context. The aim of online training course is to provide Avicenna course developers with necessary knowledge and skills required for the development of distance learning courses in general, and distance learning courses adapted to the context of Avicenna virtual campus in particular. In addition to producing courses, Avicenna has helped to establish local infrastructure and transfer best practices and professional know-how within the participating universities (EUMEDIS 2006). UFC is the focal point for Avicenna in Algeria. See Figure 3, a screenshot of a sample of courses in Arabic.

Figure 3.
AVICENNA Centre in Algeria

Construction Management Curricula

The project consisted of four phases: Assessment, Planning, Implementation, and Evaluation, aimed at:

- determining the educational needs and goals of the cooperating Algerian institutions,
- developing a roadmap to achieve these goals,
- gaining knowledge in core areas of Engineering Management, and
- offering degree programs in Algeria via traditional and distance learning methodologies.

Throughout the four phases of the project, the multi-perspective vision not only facilitated an effective assessment of the institutional needs in Algeria, but also led to integrated efforts for planning, implementing, and evaluating the proposed program.

The main outcome is a special graduate program in Engineering Management called PGS (Post Graduation Spécialisée Degree). After a providing the Algerian faculty members with the appropriate training in the USA, the graduate program was prepared based on the program offered at University of Minnesota Rochester, and was approved by the Scientific Committee of the School of Engineering and the Ministry of Higher Education in Algeria. The program has been a success in Algeria since its first offering. Another new graduate program has been initiated at university of Tlemcen related to graduate study in Civil Engineering Management. A similar special graduate study program (PGS) in Construction Engineering Management has been accepted in other universities in Algeria such as the one at the University of Oran 3-year program provided a mutual benefit through a long-term partnership between the USA and Algeria. The faculty on both teams was able to work closely in developing/customizing courses and advising graduates.

The participating Algerian institutions is taken the leadership in reaching out to other higher education institutions and industry in Algeria, as well as neighbouring countries, to share their experience in order to develop collaborations. Although the Algerian educational system remains highly centralized, it is anticipated that these collaborations will lead to self-sustained programs for modernization of the Algerian economy, with the Algerian Ministry of Higher Education playing a major role in supporting these efforts. (Baghli, Grasman, Belarbi & Saygin 2007).

ALGERIAN VIRTUAL UNIVERSITY

Algerian Virtual University (AVUNET) is a Multilanguage environment for distance education making use of the new information and communication technology specifically Internet and hypermedia. Based on client-server architecture, the platform is developed in PHP/MySQL and is software independent. The data set is stored on the server in a centralized database (Djoudi, 2009).

Platform addresses users, who are either at the university, home or connected from access points and aspire to be trained, supplement their knowledge or to evaluate their qualification levels. The Information module presents a detailed description of the platform and the access methods and use with level and prerequisites indication.

The efficiency of an educational site is mainly based on the way textual as well as graphical information is organized, on the navigation flexibility and interactivity. Consequently, a design guide is elaborated according to appraisal concerning sites building, and taking into account several web sites analyses. Such guide is intended to facilitate teachers' task, while enabling them to build cognitive courses through a design plan and recommendations.
A course building serves to structure its content in order to facilitate its training, what will allows to reach pedagogical objectives and significantly reduce problems raised by users. Such design process may be achieved following several steps.

First, it is necessary to identify specific training objectives and structure content into logical training units. Second, a complete use scenario of use of the web site has to be achieved.

Finally, navigation flow chart and site logical links have to be specified, allowing thus user to build his knowledge mental structure and then produce pages models. A model is intended to standardize semantic units' presentation of the web site (typography, page setup, title, graphical element locations, etc.).

The educative server essentially focuses on information structuring and organization according to learner's abilities and skills, which are aimed at learner model building. It provides to learners structured courses that are linked to several related exercises. Distance on-line courses are aimed at familiarizing learners with basic concepts of communication and networking

and providing them with new ways of teaching and learning using distance teaching techniques. Furthermore, several collaborative tools have been designed to give them an opportunity to work together.

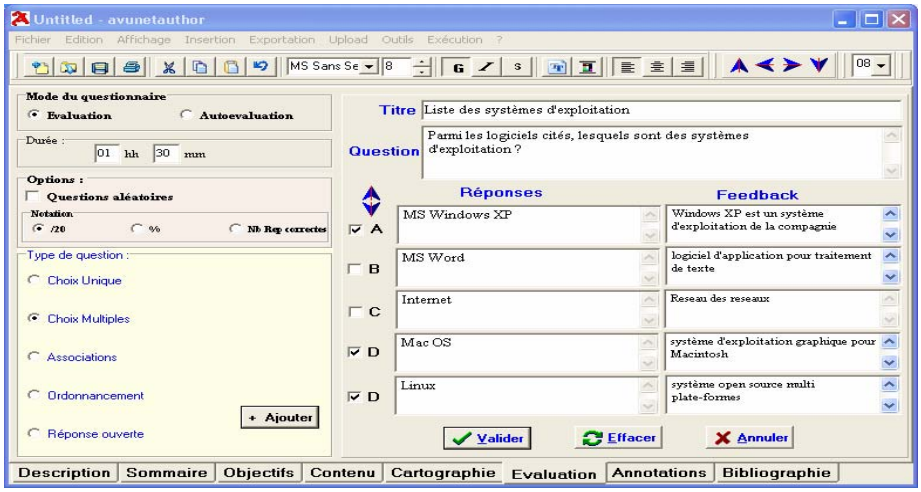
The server is structured into educational workshops, whose contents are individually or collectively built by teachers. Based on virtual book metaphor, every course is structured as chapters, sections and paragraphs. A course has a modular structure, including a presentation page, which contains links to a table of contents, glossary words, and an on line bibliographic list. Navigation within course components is achieved using buttons and arrows. For a start, students must execute a formal registration that should be transmitted to the server for authentication and options selecting (i.e. novice or expert mode, sound, etc.). After finishing the course, a student will gain experience and may study the subject thoroughly (under expert mode) or evaluate his knowledge according to several parameters specification. This will help adapting training materials and interaction according to learner's performance. The underlying mechanisms are Java interface and interactive HTML forms. Such forms are automatically transmitted to the server and will be processed. After which, another page of information is returned to the learner for review. Thus, learners are enabled to communicate with teachers through email, and from any web page, they may ask a question or be well informed about frequently asked questions as well as the associated answers of teachers (Douidi, Djoudi & Khentout 2007).

Learner Evaluation Tool

The evaluation is a fundamental aspect in education. It is indeed crucial that the instructor can evaluate what the students have understood and what they did not. It is also important for the students, during their training, to be able to evaluate their knowledge. This evaluation has double objectives. One it must make it possible for the instructor to propose, at the start of each learning object, either a pre-test, or a test of pre-requisites. Second it must also makes it possible for learners to self- evaluate at the end of each learning object by proposing an exit test. In learner evaluation tool the instructor in charge of the course can access this module in design mode. Each questionnaire is associated with a learning object. In this mode, the user can create a new questionnaire or open an existing questionnaire. The user must be able to choose whether the questionnaire is intended for the general evaluation or the self-evaluation (should the response time be fixed or not).
He/she has the possibility of choosing the grading system for each question and for the whole questionnaire (number of correct answers, percentage, mark out 20, etc.). It is possible to illustrate the question by a text, image and

possibly an audio or video file. A feedback is associated with each response in the form of a detailed comment (Figure 4.). Once the questionnaire is finished, it is saved on the platform server. The learner can access it via the web navigator or learner interface. The user chooses the questionnaire of the concerned subject. Based on the questionnaire the learner can either take a general evaluation or a self-evaluation. In self-evaluation mode, the user has the choice between having the questions (and even the answers) in order or in a random order. He/she must be able to choose between displaying the answers instantaneous or wait until the end. The evaluation process is done while moving forward from one question to another with the possibility of returning backward. At the end of the questionnaire, in self-evaluation mode the grade as well as the correct answers and feedback are displayed. In evaluation mode, the results are recorded on the server and/or sent by email to the concerned instructor. This tool is used also to analyze the grades of group learners: display learners' lists and their grades, compute the averages, maximum, and minimum grade, etc. This option gives the possibility to the learner to compare himself/herself to other users automatically. This comparison is also an interesting argument to make it possible for the user to see where he/she stands comparatively to others.The learner evaluation module is being tested in real practices within the framework of the instructors' didactic activities at the University Ferhat Abbas of Setif. The users expressed a real interest in the system where the different types of questionnaires are available through a unique and homogeneous interface.

Figure 4.
Qestionnaire Design Interface



The interface simplicity and the integration approach are positive assets of the system. The instructors will propose adequate questionnaires. After the evaluations, the course coordinator will recover the data. In self-evaluation mode, at the end of each questionnaire, the user will get a feedback in a form of comments on the questions and the various associated answers. Several teachers expressed the desire for operations that allow them to represent the questionnaire in other data formats (primarily rtf, txt and HTML).

AVUNET Platform Evaluation

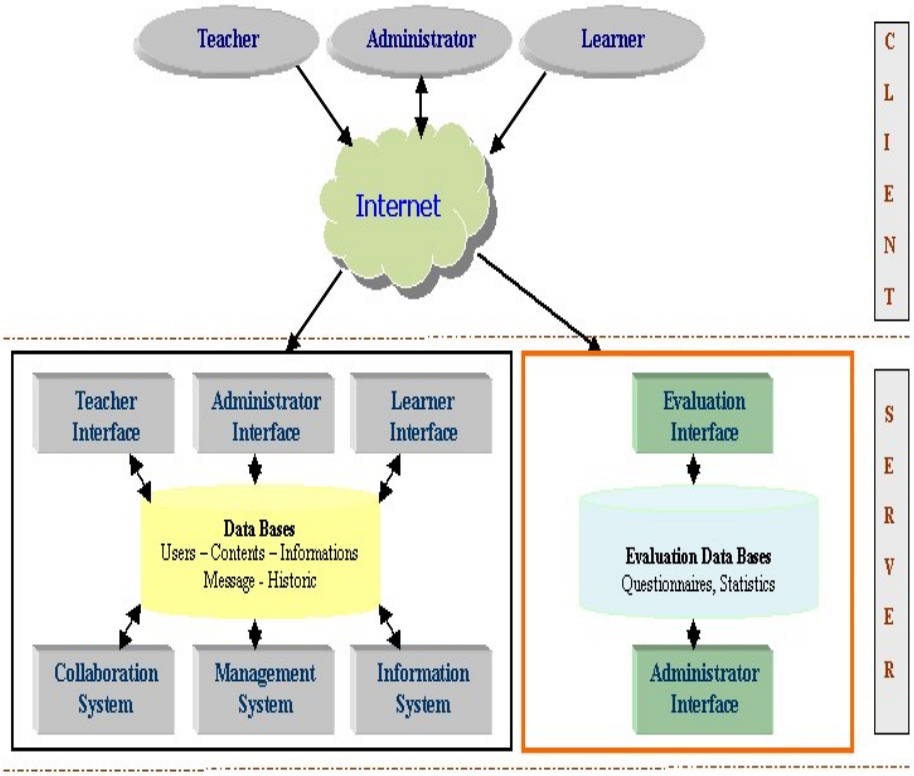
The evaluation is a function which consists in carrying an appraisal, as systematic and objective as possible, of a completed project or in progress, a program or a set of actions lines, its design, its design and implementation and results. It is a question of determining the relevance of the objectives and their degree of realization, efficiency in comparison with the development, the effectiveness, the impact and viability. The evaluation must have the possibility of improving the policies, programs and projects and provides the elements necessary to justify the actions taken, with the information intended for the public. Any E-learning platform and provision should give opportunities to improve the quality and the variety of teaching and learning which would not otherwise be achieved through traditional methods.

The aim of AVUNET Evaluation is to give possibilities for different users of the platform to provide their opinion on the whole or a part of the platform. This is accomplished via the filling of online contextual forms. The collected data will be then sent to the server to be processed. Using the forms, the user thus transmits information to the evaluation server.

The forms are based on a relation between the user and AVUNET platform, and on the PHP scripts located on the evaluation server. At the time when a PHP script is started, the parameters fixed in a HTML definition of a form are automatically imported and made available in PHP script as variables bearing the same name.

In order to avoid collecting erroneous data, a method is chosen in which the user chooses from given possibilities only. This approach will eliminate the possibility of errors. The mechanism is to choose ready made options (list boxes, radio buttons operator, check boxes.The access to the data is possible only via the administrator account which gives the permission to examine, print, delete, and synthesize the data recorded in the database (Lamri Douidi, Mahieddine Djoudi, Chabane Khentout, 2007. See figure 5

Figure 5.
laSform Architecture & Evaluation System



ELEARNING RESEARCH PROJECTS

The integration of information and communication technologies into the education field is in constant progression and generates empirical approaches for educational environment design. Some research projects in distance learning are introduced in several universities in Algeria

Virtual Laboratory for Elearning

A virtual laboratory is defined as: "A digital work area for distant collaboration and the experimentation in research or other creative activities, to produce and deliver results using the distributed information and communication technologies". In general, the development of such environments requires multidisciplinary competences: knowledge of the experimental installation and instruments, competences in distributed

computing, communications protocols and the Web technologies. In many cases, this complexity leads to the development of applications specific to a particular laboratory or even to a simple.

The motivations which guided the development of this work were based initially on the fact that the AVUNET platform does not support practical work remotely because it does not contain a distant laboratory or a virtual laboratory.

The lack of such type of structure must be covered and thus the presence of a virtual laboratory is essential for any educational platform in order to complement the theoretical knowledge, acquired by the learners, with practical teaching activities collaborative or cooperative. Also the idea to propose a conceptual architecture of the virtual laboratories is justified by:

- The possibility of performing experiments that can not be done in real life for various reasons (high cost, experiment duration is too long and learner ability is insufficient, etc).
- The experiment can be simplified. Although this point deserves to be discussed, the operations to be carried out in a virtual laboratory are easier and faster than what is needed to be done in real experiment.
- The learner performing the experiment and the equipment used for the experiment do not have any risk in the case of wrong manipulation.
- The machine guides the learner and save the accomplished work.
- If simulation is sufficiently complex, learner has the freedom to investigate which is usually not available during real practical work. The learner can decide the experimental strategy, proceed by trial and error, repeat many times different attempts, in other words to carry out a true research.
- The computer indeed allows the learner to make mistakes without danger, and without penalization other that time wasted.

In order to attend the expected objectives of a virtual laboratory, the design of ergonomic interfaces constitutes a very important task that must be dealt with. These interfaces are complex interfaces.

They represent a real time simulation environment of real learning scenarios as much as possible. They even create imaginary scenarios that can not be done in the real world.

The interfaces' design of scenarios of distant practical work requires the environment to be represented in synthesized images to solicit the learner's senses and motor competence within the framework of activity acting on virtual objects. So, the use of virtual reality is essential. The virtual reality with its capacities to manipulate virtual objects or to move in a 3D reconstituted digital scene, makes it possible to create interfaces which immerge the learner in micro world where he/she can realize his/her practical work and to cooperate with his/her colleagues in the same group and allows the instructor to supervise the learners and to even intervene during the manipulation (Harous, Djamila, Djoudi & Douar 2008).

Multi Agent System for E-Learning

As the teacher has multiple and diverse tasks to assume, moreover he has to follow-up and communicate synchronously with learners. Since he cannot be ubiquitous, and he is exceeded and overloaded by his tasks, some situations require artificial agents to assist him, and thus, bringing support and accompaniment to the learner, such as:

- Automatic correction of the quizzes;
- Learner exercises resolution assistance and orientation followed upon the request of the learner or the thinking time collapsing or a learner erroneous answer;
- Learner course majestic explanation
- To manage the meeting time taking account of the availability of the various actors, ensure the communication between members, and animate the dialogue and take care and motivate the learner left apart from the interaction.

An agent is widely understood to be a software entity situated in an environment, autonomous, reactive to changes in its environment, proactive in its pursuit of goals and social. Whereas some characteristics cannot be used as determining factors since, they are grey shades of a scale that encompasses both objects and agents.

The Multi Agent Systems adapt well to the design of digital work environment because: The distance learning systems are open, dynamic and complex; and agents are a natural metaphor of human acts. These agents have to communicate with the users "actors", make decisions, assist learners, help teachers, consider and modify the users Database, access to the Knowledge Base. See figure 6.

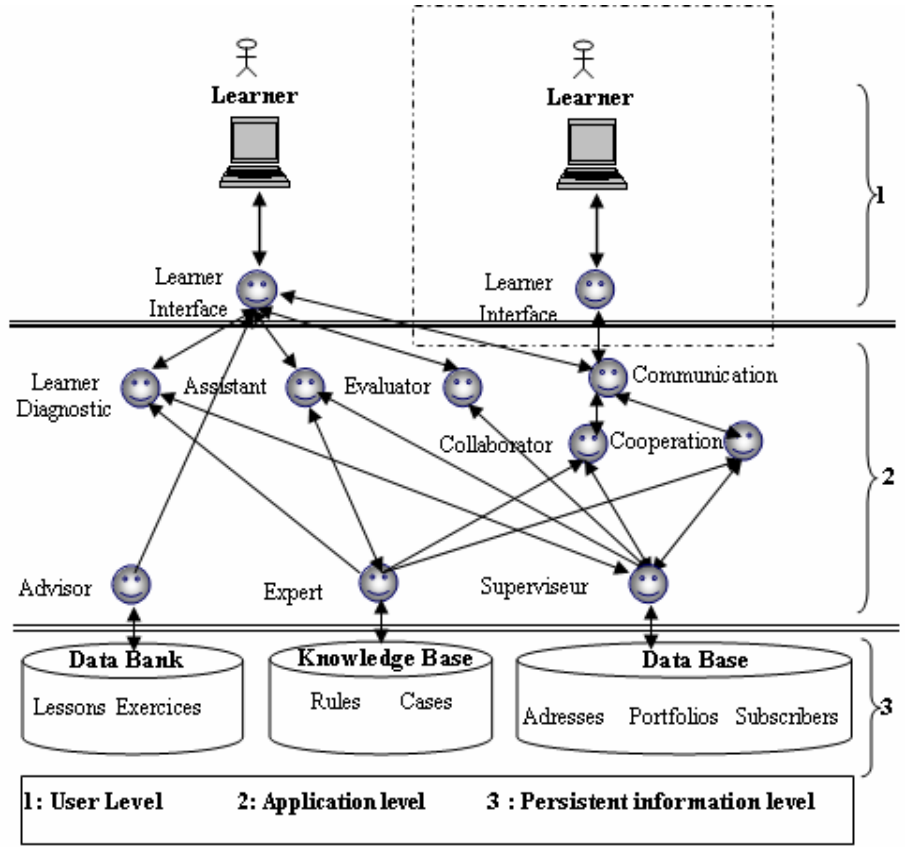
Two important metrics of the software engineering: cohesion and coupling enabled us to identify and structure agents according to the MASE "Multi Agent System Engineering" methodology. These agents are:

- Learner Interface: This agent has to get, announce and return available information relating to the user needs.
- The assistant “Companion”: It has to assist the learner, to orientate him in the resolution of the assisted exercises, to answer his questions directly and dialogue with him.
- The collaborator: It notices and diagnoses correlations between learners of the same group. To re-aim the group in a productive direction and pay attention to the members left except correlation and save the group session work.
- Communication: Manage synchronous/ asynchronous, confidential/public communications, between the different dealers.
- Evaluator: It evaluates quizzes, returns result instantly and updates the learner valuation file.
- Cooperation: It facilitates co-operative work between working groups.
- Scheduler: It finds suitable meeting time according to the groups chiefs availability, schedules meetings according to a preset or improvised planning “programs, cancels or defers”, and warns the absents.
- Supplier: It performs access to the Database.
- The advisor: communicate and makes available information relating to the knowledge.
- Learner diagnosis: It observes and diagnoses the intentional and emotional methods of learning.
- Learner analyzer: Analyze the intentional methods “capacity, knowledge, to want, believe, and have" and emotional "pleasure, confidence, benevolence" then draw up a behavioural and epistemological profile of the learner to bring adequate human and/or artificial assistance.
- Expert: Allows the access and the exploration of the knowledge base (Khadidja & Djoudi, 2007).

Learner Behavior Modeling

The learner modelling field aims at the creation of a cognitive and affective model from the observation of the learner behaviour to the learning environment interface.

Figure 6.
Human/artificial agents' cooperation



A learner model is a computer-based data management component or system that contains information about a person's learning activity (See figure 7). It typically forms a part of a larger system such as a learning management system or an intelligent tutoring system. This model must represent the learner profile, his goals, his plans, his actions, his beliefs and his knowledge. And must be used there after to explain why a learner can not complete his training work correctly and to intervene during the problem resolution process. There are several aspects which characterize the learner model. The learner model can be: implicit or explicit, static or dynamic, specific, of

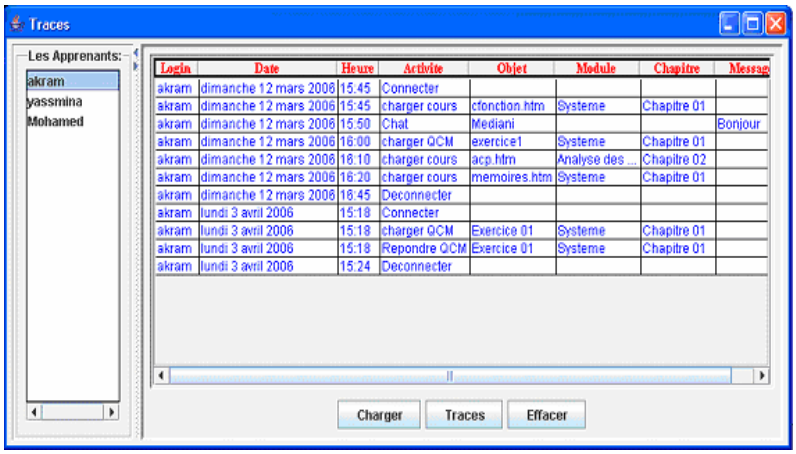
surface or of deep. For the proposed architecture, two types of the collected information are identified:

Learner FOR URS
The learner modelling field aims at the creation of a cognitive and affective model from the observation of the learner behavior to the learning environment interface. A learner model is a computer-based data management component or system that contains information about a person's learning activity (See figure 7). It typically forms a part of a larger system such as a learning management system or an intelligent tutoring system.

Static information: the learner must fill the questionnaire relating to this information on the subscribing level, among this information: The username, password, name, birth date, sex, addresses, e-mail, learner degree of motivation (high, middle, law motivation), type of media preferred (text, video, etc), the learning style of the learner (principle-oriented or example-oriented, general-to-specific or specific-to-general), type of exercise preferred (traditional exercise, semi-assisted exercise, quizzes).

Dynamic information: this information must be collected after the access to the learning platform, among this information: Degree of concentration (high, middle, law), degree of mastery of a certain topic (poor, fair, good, very good, excellent), the degree of learner interest in a particular topic (Chahrazed Mediani, Mahieddine Djoudi 2007).

Figure 7.
learner activities traces



Electronic Library Management

Digital libraries are information systems in which all the information resources are available in a format that can be managed by a computer.

All the acquisition, storage, conservation, search, access and visualization functions use digital techniques.

With the availability of Internet technologies and because it is neither practicable nor acceptable to ask distance learners to travel to a specific site (which may take a lot of their times that they do not have, that is why they decided to be distance learners in the first place) to search for the necessary information.

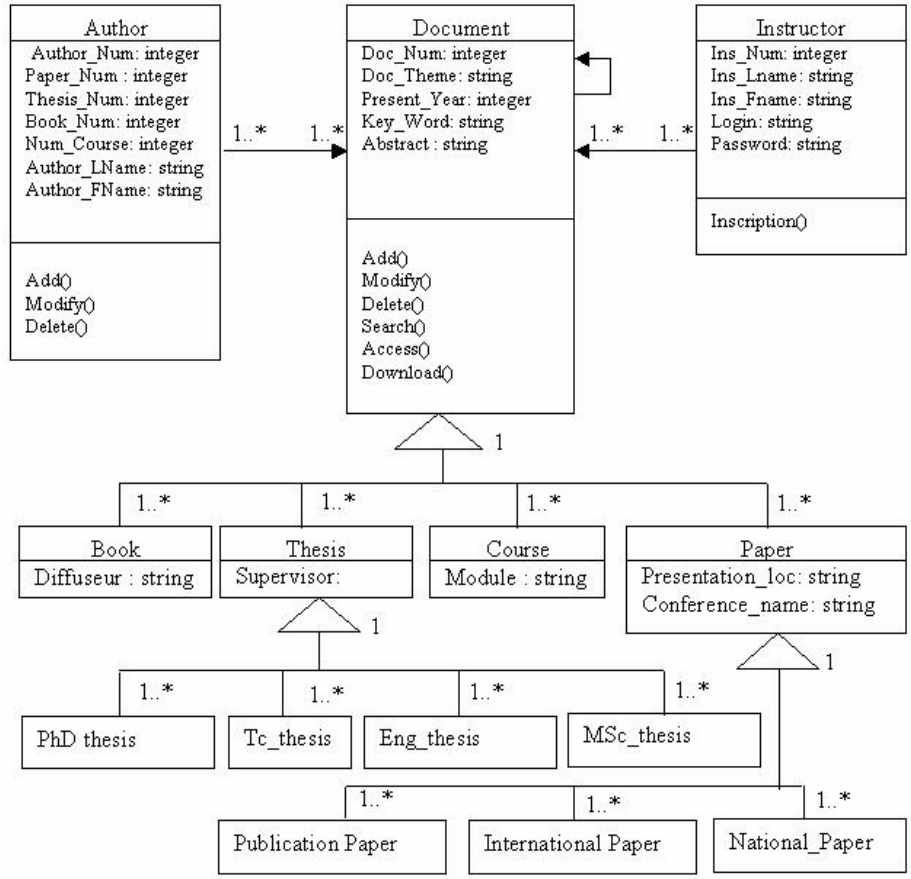
Also learners would like to have simultaneous access to all needed resources such as the courses, from any place, at any time, using whatever device (available to them) that is connected to the Internet. Then the idea to design and implement an electronic library proves to be a necessary tool that must be available not only to distance learners in particular but to all learners in general. The integration of the recent development techniques and the distributed digital content improves the learning pedagogical experience.

The goal is to design and implement an object oriented model of an electronic library This will improve the teaching process because it facilitates the access to courses, books, theses, and also access to electronic course notes which constitutes a must companion document to any course.

The modelling language UML is used to design the model. The modelling of the electronic library is described by the following different diagrams: the case based diagram makes it possible to structure the user's needs and the objectives corresponding to the system; the class diagram is a collection of static modelling elements (classes, packages...), which show the model structure. The sequence based diagram shows the interactions between the objects in the system and the component based diagram makes it possible to describe the application physical and static architecture in term of modules: source files, libraries, executable, etc. (See figure 8).

This modular structure allows the hierarchical design of the scientific documents and gives more importance to the storage problem of the scientific documents in an object based environment in order to get a better exploitation (Saad Harous, Djamila Mechta, Mahieddine Djoudi 2006).

Figure 8.
Sequence Diagram



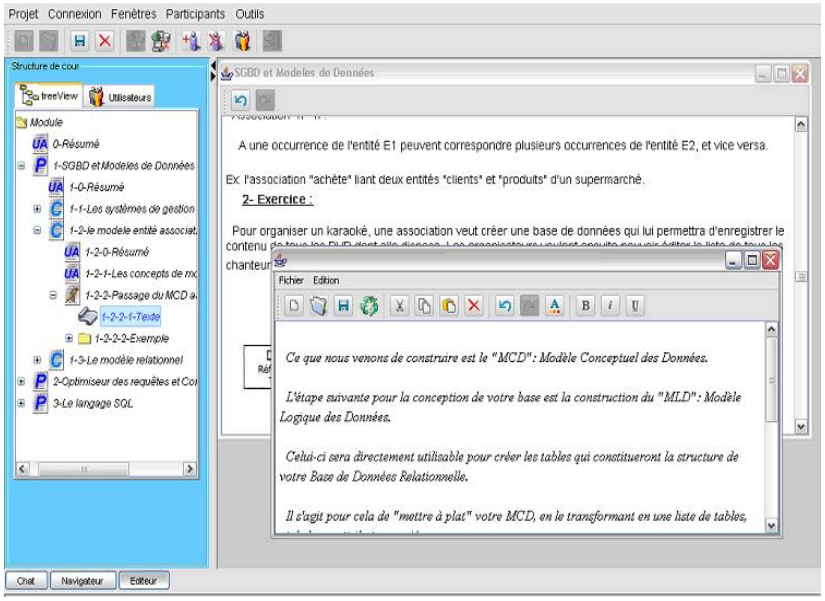
Cooperative Authoring System for ITS

Since the cooperative aspect, through a computer network, has been experimented successfully in a lot of domains, this leads us to think that it would be desirable that the designers of future authoring tools should integrate this cooperation functionality for Intelligent Tutoring Systems (ITS) production. This project is related to the design of architecture of cooperative authoring system for intelligent tutoring systems called CAMITS. Integrating cooperation paradigm in ITS authoring systems is the original idea of this project. This system allows geographically distant authors to collaborate to produce a tutoring system according to a predefined ITS pattern. The ITS pattern is implemented in PHP/MySQL and resides on a server; it can

therefore be accessed simultaneously by different distant learners. The authoring mode software, implemented in JSP and Java, is organized as centralized client-server architecture. It makes it possible to several authors to be connected to a working session characterized by a cooperative space and a control strategy. The cooperation space is represented by a set of structured components (Hypermedia Learning Units, prerequisite-networks, tutoring parameters and tutoring rules) and tools, which make it possible the edition and communication tasks. Figure 3 shows an example of a window-space where developing a Data Bases tutorial. The control strategy manages the negotiation of the access right to a component of the ITS and then participation of users during the work session (See Figure 9). Five learning principles had been incorporated into the authoring process.

These principles were: a clear definition of pedagogical objectives; definition of pre-requisite knowledge providing a variety of presentation styles (tell, show and do), enhanced feedback and testing, and permitting the learner to control the direction of the learning session by choosing himself the pedagogical objectives. Two different approaches were used to test the validity that the system actually incorporated pedagogy and effective cooperative design concepts as part of the developmental process.

Figure 9.
Developing a Data Bases tutorial



To evaluate the system a group of four teachers were surveyed to seek their opinion if the authoring system did incorporate the five learning principles into its design. Their survey results validated that the system would prompt developers to build an ITS based on pedagogy. In addition a high agreement was noted in the self-direction of the lesson offered to the learner. In a second means to validate the system, five teachers geographically dispersed were invited to develop a data base tutorial, via local network, and were surveyed to seek their opinion if the authoring system offers all cooperative tools necessary to construct the tutorial in a synchronized manner.

Although the system does exhibit positive results after a pilot test in the local network context, a question for future research is the experimentation of the system in the internet/web context.

This research would provide evidence that the concepts incorporated into the system do impact learning in a positive manner. On the positive side the survey results from the two different experimentations provides indication that the system is a positive benefit to teachers and developers of web-based intelligent tutoring systems (Talhi, Djoudi &Batouche 2006).

Task Collaborative Resolution

The tasks resolution in the current environments of distance learning is often achieved individually. The interactions between learners are rarely occurring in these platforms. Even though the environment offers diversified tools of communication, these latter are little used in the activities of learning. Participation and the interaction between students remain limited enough .

The distant collaborative resolution of tasks consists of two complementary structures:

1. The first, of linear nature, represents the blackboard. Each node corresponds to an attempt of resolution leading to the final solution on behalf of the principal writer (the learner at the blackboard).
2. The second, of tree form, records all the debate initiated by the proposal for a new attempt of task resolution. Each node records any intervention or contribution emitted by a learner.

The tree structure is widely used in the asynchronous forum of discussion. The main objective is to link each message to the one-it responses or reacts. The new subjects of discussion are placed at the root of the tree and represent

the first reactions of the attempt to solve task, the others being hung up again with the existing messages.

The advantage of this representation is to hold account of succession of discussion and thus of the topics for the conversation. Any message lately added to the forum is labelled by an option of menus; this label identifies the linguistic action (to answer, to agree, to disagree or to question, to precise or to rectify) (see table 1). The options of menus are available according to the selected reaction of the participant compared to an intervention already recorded but authorized by the sequence of actions in the resolution tool (see Table 2). To avoid the confusion of the participants, only one student is, at the certain time, authorized to send his/her message. Any student has to ask for permission by emitting a request of participation. Once this latter is satisfied/accepted by the tutor, in case the teacher is present or each one has a turn in case in the absence of the teacher.

For each intermediate solution, the principal writer engages an interaction with classmates through synchronous forum, to defend and clarify his/her argument(s). At the end of the interaction, all the classmates adopt a solution or a new version is proposed and the process of continuous resolution is taken place until reaching a final version of the solution. The structure of the forum enables the participants to identify of points of coordination in the debate started during the resolution. The fact of characterizing learner's intervention in form of a "question" or an "answer" drives the learner to think and reconsider "the act that he/she is realising" and therefore, will give an educational value and improves the state of progress of task resolution.

The task resolution scenario, illustrated by table 2, is presented as follows:

- The principal writer proposes a solution. One participant Approves, disapproves or questions.
- Any question is automatically followed either by a response, or a new question.
- Any response is automatically followed either by an approval, disapproval or a question.
- Any approval/disapproval is automatically followed either by an approval, disapproval or a question.

The teacher can use several well-known methods of intervention:

- Reformulating the learner's statement so that to make it clear to all participants.

- Encouraging the participant by annotating his contribution by an expression such as “Well done!”- “Wonderful!” –“Excellent”, etc.
- Supplying the learner with more information besides that the tutor can put hyperlinks towards some parts of the courses that might help the learner (Zidat & Djoudi 2006).

Table 2.
Sequence of actions in the resolution tool

Pair interventions		**Examples**	
First part	**Second part**	**Intervention of A**	**Reaction of B**
Propose	Approve Disapprove Question	I propose the following solution by using a chained list.	- Yes, I agree. - No, Not immediately - Why not a table?
Answer	Approve Disapprove Question	Table structure is not adequate. We don't know the number of elements.	- Oh, yes - You are not right - And the pile?
Question	Answer Question	Which pointer?	- The one at the top - There are many?
Approve	Approve Disapprove Question	I agree with Salah's development	- So, do I - I disagree - Which development?
Disapprove	Approve Disapprove Question	I do not agree with the development of Salah?	- Yes, I also disagree - Me, I agree. - Why?

CONCLUSION

Consequently, f you look at training trainers who is supposed to take over shows that the number of positions available each year is still below that required to meet the demands of coaching in Algerian universities. Despite almost annual opening of new universities, overload students remains a problem for managers of these establishments. Add to this the insufficiency of teachers in some specialties where demand is high and spread over the vast territory of Algeria. E-learning presents an alternative then the more it brings benefits in terms of educational and economic consequences. Indeed with the e-learning problems of housing, food and transportation for students will no longer arise. Secondly Algeria can not afford to remain on the margins of technological innovations.

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