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Learner Evaluation Tool for AVUNET Environment

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Abstract: AVUNET Author is an authoring system which makes it possible to create interactive training modules intended for distance education. Based on the pedagogical model, the system will guide the user in the tree structure, indicating the necessary concepts to comprehend other concepts at a higher level. The users of the system are teachers, with different information technology background. The created contents are made available to learners through a computer connected to Internet[1]. The objective of our work is to integrate within AVUNET author an evaluation system which can be used by learners in evaluation or self-evaluation mode. We are experimenting with our system in real situation at the university in collaboration with a group of teachers and students. The first results of the experiment helped us in outlining a pedagogical approach based on the guidance of the learners during the training process.

Key words: Learner evaluation, authoring system, multiple choice questions, automatic evaluation, questionnaire design, distance education

INTRODUCTION

In distance education, on the top of the remote access to the contents, an online system, for learners' evaluation and self-evaluation, is necessary. This system is used to find out how much of a content presented by a distance educational system is understood by the learner. The Questionnaires consist of closed (Multiple choices questions, true/false questions, Matching items questions, filling empty space question and so on) or open (type of questions to which answers are either descriptive, algorithms, proof, and so on) questions. The open questions are corrected by the responsible instructor. The principal advantage of closed questions is that the answers to these kinds of question can be treated accurately, quickly and objectively using a program. For an efficient use, we have to take into consideration certain factors during the construction phase of a questionnaire.

OVERVIEW OF AVUNET ENVIRONMENT

AVUNET (Algerian Virtual University) is to be a multilingual environment (Arabic, French, and English) for distance learning and teaching by exploiting communication and information technologies in particularly the Internet and the hypermedia. It has a structure close to that of Learningspace, Topclass, Librarian or WebCT. Based on client-server architecture, the platform is developed in PHP/MySQL and is independent of the software environment. The data set is stored on the server in a centralized database[2].

AVUNET platform contains three systems[3].

- A production authoring system contains the necessary tools for tasks' production. It contains amongst other things a content design environment and an evaluation space to improve the learner knowledge and abilities.
- A communication and management server made up of several modules. An information module which contains the various files and data needed by the user's teaching or training activities. A co-operative and communication module which has the means to make it possible for users to interact with each other, to accomplish team works or to take part in discussions. In order to favor the co-operative learning, the interfaces are conceived in such a way to make the presence of the others known by providing indication of their availability and their remarks on the teaching material.
- A help system which makes it possible for the learner to obtain assistance or advise or an adaptation of the environment from the computer system. The objective of the designed system is to give the learner the possibility to locate him/herself with respect to time and space during a training session. The learner is presented with a chart of courses and visited pages, thus enabling him/her to have an

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explicit representation of the virtual space. Various visualization levels are set up in order to make the chart more visible and not overloaded. A

temporal panel is displayed permanently allowing the learner to monitor and optimize the training time. The user has also the possibility to access online help and a glossary containing the terms frequently found on Internet and likely to be misunderstood by beginner. The system gives access to a set of tools: notebook, diary, work plan, etc[4,5].

AUTHORING SYSTEM DESCRIPTION

Course objectives and design approach: Our objective is to design and implement an authoring system for content design in a format directly accessible by the learner. It is a matter of proposing a representation model for the content related to the topic being taught, taking into account the perspectives of educational domain and pedagogic. Our idea is to create and organize an online access environment to a rich and varied content, which can support course development, planning and implementation teaching, and some aspects related to learner modeling.

Our contents design approach supports three prospects for topic organization: domain, pedagogy and didactic. In this approach the domain aspect is achieved by a model, which represents and organizes the domain knowledge based on the existing logical links. The organization of the objectives consists in particular in modeling the necessary preconditions to their realization and studying the impact that an objective can have on domain knowledge. Didactic dimension amounts to producing a model that defines and organizes the different tactical means necessary to the teaching of the considered topic[1] (Fig. 1).

Evaluation system: AVUNET Authoring system allows an instructor to design a pedagogical content for distance education within the virtual University. The goal of this system is to allow the creation of courses that can be used by different instructors. Each instructor can personalize his/her course based on the objectives and problems related to the concerned course. For that purpose it is recommended to decompose the material in learning objects that are independent from each others as much as possible. Each instructor can create his/her course by choosing from a database of learning objects the ones that respond to the course's objectives and problems. These learning objects are organized in such a way to create a coherent network.

Collaboration environment: The co-operation and communication system that contains the means that

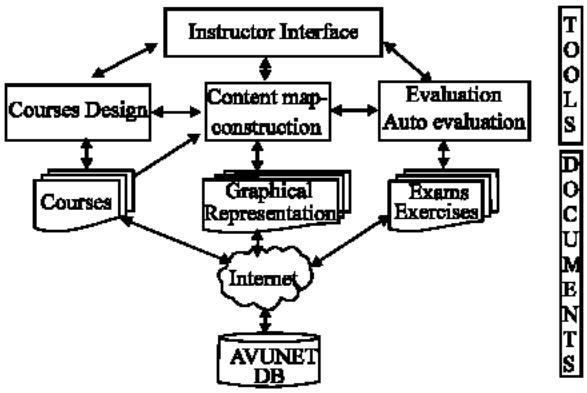

Fig. 1: AVUNET authoring system simplified architecture

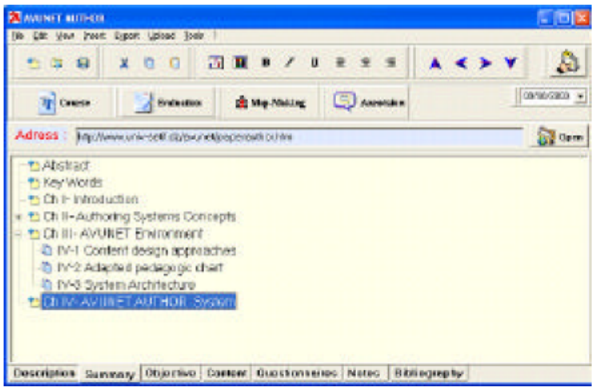

Fig. 2: AVUNET author interface

allows the user to communicate with other users [6], to complete tasks in a team works or to participate in discussions. In order to support the co-operative training, the interfaces are designed and implemented in such a way to make the presence of the other participants known by providing indices of their availability and their annotation on the pedagogical contents[4,5,7].

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LEARNER EVALUATION TOOL

Evaluation role within the system: The evaluation is a fundamental aspect and impossible to circumvent 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. There are several ways on how to evaluate a learner. The most used evaluation types are diagnosis evaluation, the formative evaluation, the training evaluation and the overall evaluation. The diagnosis evaluation is given at the start of the training to come up with a personalized learning path. The formative (continuous) evaluation allows needed adjustments to be done. Both the instructor and the learner are informed of phases accomplished. The overall evaluation measures what did the learner acquire at the end of the training. This evaluation (when passed) usually qualifies the learner to get a diplomat or certificate[8] .

The function of evaluation has an important role within the framework of the training method proposed by the authoring system. In addition to the traditional roles of any evaluation tool, the authoring system evaluation function must make it possible for the learner to distinguish the concepts already learned from those not learned yet. Consequently the facility of spreading out the learning process over several periods of time must be available[9].

Thus 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.

The various types of possible questions in the evaluation module are as follows: question with simple answer, question with multiple choices, fill in the missing text, make correspondence between two lists, order a given set of elements or open questions.

Actually the self-evaluation has a very important role within the system since it is the learner who decides to be evaluated or not. The instructor makes at the learner's disposal a questionnaire allowing him/her to check his/her progress. The evaluation is an integral part of the learning process. Moreover, it is the learner who decides by him/herself whether the obtained result in the evaluation is sufficient to consider the material has been understood.

The distance educational systems integrate evaluation modules and a good number of these systems makes it possible to integrate self evaluation systems with feedback accompanying the course and possibly to indicate the points of the course that needs to concentrate on more. In addition to didactic and pedagogic qualities of the evaluation, it helps in evolving training systems into adaptive systems, i.e. able to manage didactic material according to the total behavior of learner as in the hypermedia adaptive systems[7] or the intelligent tutorial systems[10].

Questionnaire design pedagogical chart: The questionnaires were intensively used in the teaching evaluation because they allow a fast, objective and easily programmable treatment of the answers. They were however often criticized, because the majority were badly built and did not provide a valid measurement of competences. However the majority of these disadvantages are not intrinsic to the questionnaires. Some questionnaires of the type QCM (multiple-choice questionnaire) or QCU (Unique choice questionnaire) can have a diagnosis capability higher than the open questions. For example by including among the proposed solution one or more distracters (proposed solution corresponding to classical subject errors). However, it is necessary to envisage relevant distracters to the contents (frequent errors) that do not grammatically complicated (unless that is not precisely the tested content) the questions nor the suggested answers.

Most of the time it is not necessary to insert in a QCM or QCU options that the user will not choose (even if that may add some humor). To make things clear (and in order to really test what one wants to test), it is generally recommended to avoid the negative formulations in the questions (and a double negations). Whenever a negative formulation is inevitable, it is advisable to highlight the negative form (in capital letter, or bold for example).

The larger the number of answers suggested to the user is, the more the test is discriminating, by reducing the probability of answering correctly randomly. Moreover, it is strongly recommended to count a negative score for the erroneous answers. This will encourage the user who does not know the answer to abstain from answering, rather than to answer randomly.

At last, the questionnaire designer usually tends to place the correct answers around the middle. But do not hesitate to place a correct answer at the beginning or the end of the options list. Also we have the tendency not to include the correct response of two questions, that are one after the other in the sequence, in the same order.

Questionnaire design: In AVUNET authoring system, we implemented a module for learner's evaluation and self-evaluation. Only the instructor in charge of the course can access this module in design mode. Each

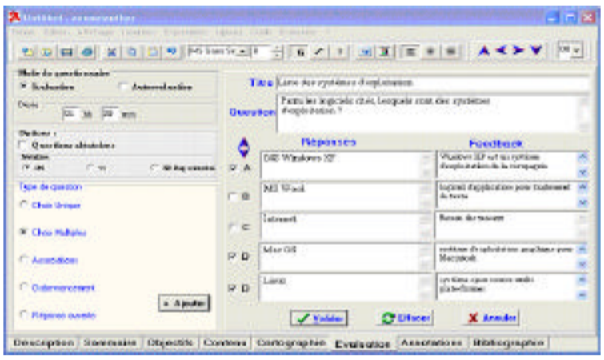

Fig. 3: Questionnaire desingn interface

questionnaire is associated with a learning object. In this de, 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 (Fig. 3).

Questionnaire use: 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 feed back are displayed. In evaluation mode, the results are recorded on the server and/or sent by email to the concerned instructor.

We have designed and implemented a tool to handle the answers given by learners during the automatic evaluation. 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 does he/she stand comparatively to others[2].

Implementation and experiment: AVUNET Authoring System is a client tool designed and implemented based on object oriented approach using DELPHI under Windows. We adapted a progressive approach in integrating functions offered to the instructor through a simple graphical interface. Because the kernel is independent from the interface the system can be adapted very easily to the instructor's requirements.

In the current version of the system, the questionnaires design module is operational. The user uses this module to design questionnaires for the evaluation or self-evaluation intended to be loaded on the platform server or to be used in the learning mode. We have started experimenting the current version of the system. In particular the learner evaluation module is being tested in real practices within the framework of the instructors didactic activities. A limited number of instructor from the Computer Science Department at the University of Ferhat Abbas, Algeria. The users expressed a real interest in the system where the different types of questionnaires are available through a unique and homogeneous interface. The interface simplicity and the integration approach are a 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). A functionality that we envisaged to include in the next version of the system.

CONCLUSION

AVUNET's (Authoring system) interface provides an easy access to the learner's evaluation module in order to facilitate the questionnaire design. Thus it gives the possibility to the instructor to design exercises for evaluation or self-evaluation. We started experimenting the use of the tool within the system in real situations. In the near future we are planning to run an experiment on a large scale which will allow us to collect information on the effective activities of the users. This way we will be able to what are the short coming so that we can work on improving them. We are currently working on the

contribution of XML technology for questionnaire modeling and structuring[7]. Also we are studying the possibility to integrate the co-operation and the intelligence[11].

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