

G++: A Platform of E-learning

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Abstract: The introduction of new communication and information technologies into the learning area allowed the computer, the network, the internet and the multimedia to be presented in the form of training facilities, making it possible to automate the teaching technique. In this context, the e-learning is presented as a mode of training which benefits from these training facilities and answer for the new needs for formation by proposing a new pedagogic and economic approach. This study presents a teaching software complexes of a formation centered on learner and diffusing electronic contents using multi agents systems and also of an environment in which individuals, groups and processes at the same time technological and intellectual cooperate with the realization of the formation, it is clear that to have platform of a learning and technical quality is an objective which is achieved by specifying and by giving the satisfactory solutions to multidimensional complexities which the e-formation knows.

Key words: E-learning, platform, learner, multi agents

INTRODUCTION

The e-learning is a definite concept like on-line formation, electronics and/or wide. But since it is about the training and of the on line training this concept constitutes true problematic, mainly, on the level of the concretisation of a formation in individualized line. It is seen as a mode of training evolved among the NMA (new media of training) which appeared with the progressions of the TIC (communication and information technologies) resting on formations such as the "CBT" (computer based training) and the "WBT" (web based training). This mode has like objective principal to ensure a formation (automated) on line. The whole of the functionalities, contents and communication systems define the "Platform" of e-formation or "LMS" (learning managing system)^[1]. We used Ganesha as bases of our platform while trying to cure its weak points what has given rise to a new e-formation platform G++ using multi agents system.

Platform of e-formation: A platform e-learning is a software (lodged in a Web server) ensuring a formation in line automated in an environment distributed through an Intranet or Internet. But since it is about a teaching software complexes and of a formation centered on learning and diffusing electronic contents and also of an environment in which individuals, groups and processes at the same time technological and intellectual cooperate

to the realization of this formation, it is clear that to have platform of a teaching and technical quality is an objective which cannot be achieved without specifying and to only give the satisfactory solutions to multidimensional complexities knows the e-formation. These complexities represent obstacles in front of the originators of the e-learning and are the subject of several work. Side organization this work introduced the system of management of the contents of formation (LCMS: content learning system management) to separate management from formation (LMS: Learning System Management) of that of the contents of formation and makes it possible to LMS to manage these contents on a more abstract level^[2].

The Ganesha platform^[3] presents an ideal model of the e-formation. It is conceived by a company specialized in the e-formation and following certain teaching and technical principles. It is distinguished from the other platforms by the organization and the management of several profiles and autonomy (not of additional software). Nevertheless Ganesha knows some insufficiencies.

We adopt it as a base to design our platform while being interested to solve its weak points: the non structuring and the bad management and presentation of the contents of formation by the use of the technology of the objects of training and lacks of a mechanism of individualization of the training by the use of the technology of the software agents by integrating a multi

agents system (MAS) in the platform operating on the objects of training in order to concretise this mechanism, the solutions of the hyper media and 'learning by doing' are introduced and their use depends on nature of the formation. The problem of the inter-working of the contents of formation of Ganesha is solved while being based on the concept of object of training.

Objects of training and courses on line: DesignHTML of the courses on line was exceeded for reasons of organization, economy, re-utilisability, accessibility and inter-working of the courses and personalization of the courses of formation. We choose the concept of object of training. Since 1999 the term learning object (LO) is largely used^[4], the objects of training (OA) can be defined like elements based on the paradigm oriented object allow to the originators to build small components (granules) being able to be used in various contexts of training. It can be described as own contents where each OA can be consumed independently, reusable, joined together and targeted by the 'metadata' (Fig. 1). It will make possible to the training to be 'just enough', 'just in time', 'just for you'. The properties, the specifications and the standards of the learning object include: accessibility, durability, inter-working, re-utilisability, the extensibility and facility of management. The 'metadata'^[4] are "descriptive data of other data", in our context "given descriptive of a OA". The types of metadata which can be associated wwww documents are the details, keywords and information on the type and the format of the data.

The learning objects model (LOM) was defined by Ltsc-IEEE (Learning technology standards committee), the proposals of LOM allow: to learners or authors to seek, to evaluate, acquire and use the OA, the share and the exchange of the OA with any technology supporting the systems of training; the development of the OA in units which can be combined with the software agents to compose automatically and dynamically lessons personalized for learners. LOM includes teaching attributes such as: style of teaching and interaction, main level, pre-necessary. The standard plan of LOM (D6.4 version) makes it possible to define: the difficulty, typical time of training and the relation between this OA and other OA. The composition of the courses is defined like the selection of the OA starting from the numerical library and the scheduling of these objects in a way which is adapted for the community or the targeted individual.

Multi agents system: A tool for automation: A multi-agent system is a system which on the one hand has autonomous agents acting in parallel and having to satisfy a goal or a function of satisfaction and in addition

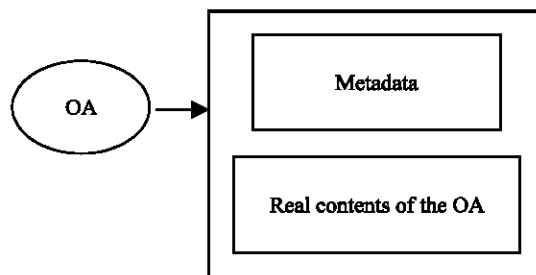


Fig. 1: Diagram of an OA

has agents communicating in their environment. The interest principal of the MAS (software agents) comes from their adequate potential, for the development of the educational systems, which is due to the fact that training-teaching complexity is easier to solve while following a co-operative approach. For that an environment of intelligent training presents a very advanced class of tools from a point of view teaching and organizational and more adequate for the objectives of the training in the organizations^[5,6]. We seek to develop and integrate an educational system automated "advanced" in an environment into teaching scale and socio-technique, and if it is admitted that the concept of agent (natural or artificial) makes it possible to define in a homogeneous way this system and its environment; it is clear that the agents making it possible to carry out this consensus will be undoubtedly from cognitive type since they are most representative of what occurs in an environment on teaching and social scale. If the latter are modelable in an abstracted way, only some of them could satisfy the conditions of programmability.

The cognitive modeling of learner: From a pedagogical point of view, the design of the e-learning must take into account that there are various classes of learners. The methodology of teaching in each class is different and must have an interest clear of the technical environment, to the service of learner which uses the system. To achieve this goal, the cognitive modeling of learner is necessary and must create a clear specification of the profiles of learners. An environment of intelligent training must build and update the model of learner associated its individualization and this modeling varies from one learner with the other. This difference must be considered, when we develop an environment of intelligent training effectively. Performances of learner in the field, the transparency of the technical terminology, the objectives and the hopes of learner and its preceding experiment must be taken into account.

G++: A platform of e-formation: By using the concept of object of training, the redefinition of the notion of the module of formation of Ganesha consists in regarding a module of formation as a whole of objects of training and not a whole of files Internet. We adopt to structure and organize a module of formation the following hierarchical approach:

Module -> Chapter -> lesson->OA->OI (Object of Information)->{ texts, images, sequences audio and video, animations, simulations, buttons, bonds, ...}

This approach allow to break up the objectives of the module of formation into under objectives and to facilitate the training i.e. the connection of knowledge and the follow-up of the formation by learner according to a linear covered from the objects of training.

To achieve its teaching goals an OA must have a visible structure facilitating the tasks of design symmetrically, of training-teaching and which presents an OA like an independent and discrete mini-course. For that we adopt, an approach of separation between information of representation of an OA and its contents which is the whole of objects of information^[7] (Fig. 2 and 3).

From a teaching and theoretical point of view, we solve the second weak point of Ganesha by the addition of a fourth principle to its teaching principles. The three teaching principles of Ganesha represent a simulation of the traditional formation; we noted that this simulation is insufficient and missing to put principles at the e-formation which is finally oriented learning and not oriented objective or oriented group, our initiative aims at adding more rigour in handling of e-formation even to the theoretical plan. We call this fourth principle: mechanism of teaching and technical individualization of the training. The concretisation of this mechanism is done using system multi-agents.

Pedagogical principles of G++: G++ was conceived according to four teaching principles and at the base of the resolution of two weak points of Ganesha 1.3: the non structuring of the module of formation and the absence of a mechanism of individualization of the training.

1 Module of formation (simulation of a book) is a set of objects of decomposed following the hierarchical approach described previously. The production of this module is done by using the tools independent of the platform and which make it possible to produce modules of quality.

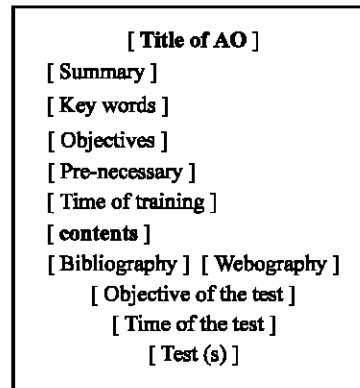


Fig. 2: Presentation of an OA

- 2 Training session (simulation of a book used in a classroom), includes the activities of training, tutoratand communication 'on line'. The animation of this session is done by using the tools of synchronous and asynchronous communication and collaboration (the blackboard, the mechanism of individualization, the assistance, the mail, space forum, the delivery point (private or public) of teaching documents of various formats, interactive planning, the chat...).
- 3 Platform of e-formation (simulation of the organization of formation) is software which allows the integration of the modules of formation in the platform. The animation of the training sessions and administration of the distant formation.
- 4 Mechanism of individualization (character of the e-formation), manages the teaching individualization by the personalization of the formation according to a learner model (bases knowledge) and following teaching criteria and technique from the training by the personalization of the interface according to the preferences of learner (police of text, colours, graphics...) and following ergonomic criteria. The working of this mechanism is based pedagogically on the modeling of cognitive of learner through agent technology and the deposits of training objects, the hyper media and/or learning by doing and technically on the tools of personalization of the interfaces (Skin...).

The techno-pedagogical organizational model of G++ :

The techno-pedagogical organizational model of G++ is given by agents described above. The person in charge of formation plays of the significant roles concerning the formation in the organization. He specifies the objectives of the formation, controls the activities of administration and manages and controls platform.

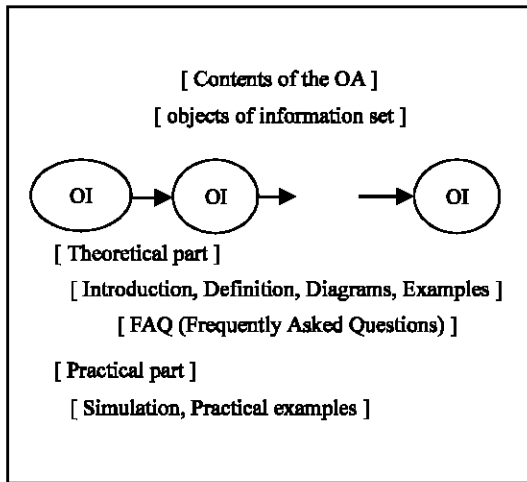


Fig. 3: Structure of the contents of OA

AGENTS OF G++

Our approach of design of an MAS is oriented activity and not oriented actor (e.g., Baghera^[8]). Our approach aims at automating a whole of activities of e-formation according to a whole of software entities representing the agents.

The agent assisting of learner (AAL): With each learner on line, is associated an agent AAL, it plays the role of interface between learner and the platform by ensuring the communication with the platform and the other users, the delivery of the OA to learner according to the course, manages information relating to the current activities of learner and contributes to the individualization of the training by evaluating the lacks of knowledge by specific tests, by finding OA making it possible to fill these lacks, this task is carried out in co-operation with APA (Agent of the course of training).

The agent tutor of learner (ATL): ATL remains with the listening of a possible question coming from one learning on the contents of an OA^[9]. With the reception of a question this agent comprises like an intelligent agent of Question and answer, to find the good answers to the questions. In the case of failure it redirects its questions towards the suitable tutor among the tutors of the module.

The assisting agent of tutor (AAT): To each tutor in Tri line is associated an AAT agent, it plays the role of interface between the tutor and the platform by ensuring the communication between them contributes to the management of the activities of teaching by showing the results of advance of each learning in term from the

history of training, the difficulties finding by learner and the giving questions all that is carried out by classification, measurements and statistics and in co-operation with AGP (Agent Management of the levels)^[8]. Thus AAT minimises the tasks of the tutor.

The agent of the objects of training (AOT): This agent is specialized in the management of the data base of the objects of training; AOT assists the generic agent APA in the construction of the courses of training and the generics agent AAO (assisting agent of the originator) in the management of the contents of formation.

The agent of the course of training (APA): APA is charged to create the course of training which is able to fill the lack of knowledge of one learner Api supported by AALi.

The agent management of profiles (AGP): AGP is specialized in the management of the base of knowledge of learners.

The assisting agent of originator (AAO): AAO assists the designer of the modules of formation to manage the contents of the data base of the OA.

The agent management of levels (AMN): AMN manages the levels of knowledge relating to each module^[10], AMN stores the information inserted by the administrator concerning the modules of formation and the associated levels (whole of the OA which must be passed through successfully) and for each learner AMN manages its level of knowledge, this task is carried out in co-operation with AGP.

The agent waiter of agents (AWA): AWA is charged to ensure the correct operation of the platform of the agents; therefore all the agents are carried out under the control of AWA. It is noted that this agent accomplished of the tasks parallel and complex what requires many programs parallel and bring to increase the number of the AWA to avoid the degradation of the performances^[9].

THE PROCESS OF INDIVIDUALIZATION

At the moment of learner training Api, when the AALi agent discovered a lack of knowledge MCI corresponds to OAj (because of expiry of time of training suitable for OAj or a considerable number of returns ' feed back'). It requests agent APA to achieve the three following tasks: to create or select a specific test able to evaluate MCI, select and compose a set of OA {OAj1,

OAj2..., OAjn} in co-operation with AOT, to build a course of training able to fill lack MCI of Api one and finally to enrich and modify Pai according to reactions of learner. AALi stores all information relating to the current activities of learner and periodically these information will be sent to AGP to be stored in the base of knowledge of the learner profiles. At this time AGP and AMN update the level of knowledge of this learner.

CONCLUSION

We really understood the will of the involute team of Ganesha, to transform this project into a true Community project. This will is proven by its decision to return this project in 'open source', the contribution to the transparency of the technical terminology of the e-formation and the evolutionarity (the structuring, directed programming object...) of the software. That justifies our choice of design of a platform of e-formation based on Ganesha. We had all the will to contribute to the improvement of this platform while benefitting from the recent changes in the world of the e-learning. Extension of Ganesha: G++ is finally only the result of this will while being based on two technologies: the technology of the objects of training and that of the software agents. Our approach of design aimed at making of a modern platform which manages effectively the autonomy of learning.

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