New Pedagogical Tools for Mobile Learning Groups

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The application of new technologies (most of them, mobile ones) to the distance learning involves new problems that require new and innovative solutions from both pedagogical and technological points of view. The same system that provides teacher-student communication provokes an excessive demand on teacher's response capacity, thus preventing the communication they were intended to provide. This problem becomes more serious in the case of non-regulated education, since the degree of isolation of all agents, that use to be distributed and, thus, mobile agents, is much higher than that of regulated education. Also the advent of the 3rd generation of mobile communications, the degree of penetration of mobile devices and the consequent value-added service make one assume that the problem will become more serious.

We are to develop a new methodology that improves and optimises the relationships between learners and teachers, by means of more efficient use of the new technologies. As a result, one main goal will ensure the global personal connectivity and enable access to wireless multimedia communications and learning services by any learner, from anywhere, at any time, with capacities, quality and performance comparable to those of fixed network services.

This methodology is called Learners Relationship Manager (LRM) and is designed for communications between groups of remote and unconnected students which, on the basis of an exhaustive analysis of the current forms of communication and the information flows, can propose new management methods for the groups and new technologies to facilitate said management.

To reach that goal, we are at present working on the development of tools for the monitoring and evaluation of students and the education process itself dealing with the treatment of the information flows and communication processes for optimised management of actions in the learning groups:

- ***Intelligent Pedagogical Segmentation Manager** (IPSM) tool. This segmentation will be performed on the basis of information of very different kinds (e-mails, log files, chats, personal evaluation, ...)*
- ***Intelligent Pedagogical Action Manager** (IPAM). To automate actions addressed to each one of the student segments*
- ***Intelligent eMail Manager (IeMM)** which classifies, re-addresses and replies to the e-mails.*
- ***Pedagogical Content Manager (PCM).** Based on the learner segmentation it is possible to offer personalised content to the learners*
- ***Pedagogical Pursuit and Evaluation Manager (PPEM)**. Another interesting application of the CRM technology could be applied to the pursuit of the learner and even for their evaluation.*

The developed tools had to be integrated within the actual distance learning technologies of the final users, for this reason our system is structured following the principles of the open, component based, modular architecture which will permit the reusability of the modules in various training scenarios and operations, with wide acceptable standards, are to be used to permit the interoperability with the existing hardware and software.

I. INITIAL PROBLEM

At present, teachers at any teaching centre have a series of technologies available to them, at both infrastructure and application level, which allow them to support groups of students who are not physically present.

However, the application of these technologies involves new problems that require new and innovative solutions from both the technological and pedagogical points of view.

The same systems that provide teacher-student communication provoke **an excessive demand on the teacher's response capacity**, thus preventing the communication they were intended to provide.

Likewise, current forecasts on the degree of **penetration of mobile devices** and the consequent value-added services make one assume that the problem is becoming more serious. This fact leads us to

reflect on the added problems of this new access channel and to detect the disadvantages of saturation of the added information flows.

Finally, this impossibility of maintaining the **personal communication flows** between the group members makes it impossible to achieve an appropriate monitoring of the students by the teacher.

Lastly, we should mention that all these problems become more serious in the case of **non-regulated education**, since the degree of "isolation" of all the agents and methodologies established is much higher than that of regulated education.

II. SEARCHING A SOLUTION

The solution to the problems described requires the definition of **a new methodology for communication between groups** of remote and unconnected students (hereinafter, distributed pedagogical groups or distributed classrooms, since the teachers are also included), which, on the basis of an exhaustive analysis of the current forms of communication and the information flows, can propose new management methods for the groups and new technologies to facilitate said management.

Ped-Care project aims at smoothing the on-line relationship between learners and teacher through a new communication methodology and supporting tools.

This is why results on the following issues are provided:

- Develop a new methodology (**Learners Relationship Managment - LRM**) that improve and optimises the relationships between learners and teachers, by means of more efficient use of the new technologies.
- Study of the effects of new mobile services in the processes of distance education courses.

III. SOLVING THE PROBLEM

III.I. Objectives

The implementation of a CRM system implies a change in the philosophy of business. This means maximise the benefit using the information available from the clients instead of, for example, reducing production costs. If we consider education as a business where clients are students and the benefit is learning, **we propose applying CRM-like techniques to improve learning by exploiting available leaner information**. As with CRM, the target is to optimise a series of parameters such as client satisfaction, in this case students, but also the market value, taking into account the cost that it implies for the organisation, in this case the teacher.

Nevertheless, the first step in order to apply these techniques, is to define adequate metrics for the evaluation of the objectives, for which we require to count on the co-operation of teachers, pedagogues,… For example, **a parallelism between clients' loyalty and students' motivation can be established, or between the client's potential value and the current evaluation of the learner or between the recommended sale with the personalised contents**. The control of these parameters is performed automatically by intelligent implemented managers, enabling decision making, teacher notification, event information to students throughout the course, such as imparted lessons, navigation through contents, taking examinations, etc..

To implement this system, we base ourselves on the methodology of a CRM system in business, considering its application in the field of distance education. The process to be followed starts with the definition of the business objectives (measurement of students' motivation based on parameters such as number of student withdrawals throughout the course, number of voluntary tasks done on average considering the difficulty, number of e-mails interchanged with the teacher and setting-up of

evaluation criteria). Then the definition of metrics is possible and provide an estimate of the success gained in each one of the objectives.

This approach to the matter is enabling us to deal with the above mentioned problems supplying the following solutions:

- Relief for the teachers on overload.
    - Automatic processing of e-mail.
    - Automatic decision-making or assistance in such decisions.
    - Automatic follow-up of students.
- Personalised teaching by segmentation techniques.
    - Personalization of contents presented to students.
    - Personalization of the follow-up and evaluation methods, which will now be possible thanks to the automatization of these tasks.

Therefore, PedCare's main target consist of optimising parameters such as client satisfaction and market value, taking into account the cost that it implies for the organisation (the learning centre). That way, applying CRM techniques, the following scenario with different agents is obtained:

- Instead of **Clients/Agents, Learners/Teachers**
- Instead of **Clients' loyalty, Learner' motivation**
- Instead of **Client's potential value, Learner's evaluation**
- Instead of **Recommended sale, Personalised contents**.
- Instead of **Benefits, Learning**

As a result, the products being obtained are as follows:

- "Best practices" for imparting distributed non-regulated education
- Tools for treatment of the information flows and communication processes for optimised management of actions in the learning groups.
- Tools for the monitoring and evaluation of students and the education process itself
- Test laboratory

III.II. System Definition

As can be seen, some needs clearly arise for which the development of tools with certain advanced characteristics are necessary and that require, therefore, a previous investigation process, based not only on technological aspects but also on sociological and psychological aspects.

In the first place, all these tools are based on an **open and modular architecture** that enable its implementation in the different actual learning systems (various forms of Virtual Learning Centres) offering them new complementary tools that will remedy some of their more significant needs. This architecture will furthermore **allow its implementation in other environments**, among which we can cite: the feasible **education webs portals** (for example to facilitate the **personalization of offered contents** to clients from segmentation tools) and **the information systems of new intelligent companies** where special attention to their clients and employees will have to be promoted by implementing concepts such as the ones explained in the document (B2E strategies base on knowledge management systems).

Moreover **it is necessary to add an intelligent aspect** to all of them, as they must favour a **personalised relationship with every student who, as we have said, must be considered as clients**.

From here on a primary need arises, **the classification of students in certain segments by pedagogical criteria**. Therefore, for example, a more personalised and immediate attention is necessary for certain segments, while others, more proactive, will be able to act as session animators

or be selected as work group co-ordinators. For this segmentation it is necessary to use intelligent managers capable of gathering the greatest possible amount of information about the students and their educational activities. In this way certain data that are currently being undervalued or little used should make up an essential part of our segmentation system (degree of involvement in real time or deferred sessions, quantity and quality of the access to information, e-mails received, participation in forums, chats, news (***Intelligent Pedagogical Segmentation Manager*** **or IPSM**).

From this segmentation it is possible to carry out **certain actions orientated to personalize the learning task received by the student**. In the first place it is possible to foresee certain actions for the most problematic groups (revising actions directed to improve deficiencies regarding communication and integration). These actions facilitate as well the personalization of the offer with regard to courses and documentation that can be provided (marketing actions). ***Intelligent Pedagogical Action Manager*** (**IPAM**).

This Action Manager is able to accomplish full CRM strategies through the following actions: marketing campaigns, commercial actions, customers/learners fidelity,...All those, by the deployment and use of non-intrusive tools.

These two tools enable us to build a third one, that we consider essential for the improvement of communication between the teacher and student groups that we **call Intelligent email Management** (**IeMM**). This tool is able to classify e-mails received by the teacher as to the population segment the student belongs (**IPSM**) to and act on them in an intelligent way as indicated by the **IPAM**. Thus redirection to other departments, automatic answers with information, documentation or references to information sources, classification of messages according to their subject must be considered together with the triggering of warnings to the teacher of the appearance of certain tendencies or deficiencies in communication with some of the students.

When processing e-mail, a series of alternatives arise which signify transfer from other sectors, more exactly from automatic processing techniques of e-mail created by the advance in the use of e-mail and spam. In particular, the idea is to extend current techniques such as Sieve and other mail filters by the use of advanced techniques for the processing of contents such as natural language processing, fuzzy rule banks…, so adding intelligence to the process. Combination of these techniques and information obtained through the other processes described enable an efficient automatic management of e-mail, mitigating the teacher's work burden. As can be seen**, the intention is to shape the student's response and his/her interaction with the teacher by applying automatic training** techniques from the artificial intelligence field. In this way it is possible to automise the teacher's decision-making processes and personalise attention to each student.

Based on a good segmentation of the students profiles it is also possible to develop other tools that allow us to offer personalised pedagogical contents to the Learners (**PCM - Pedagogical Contents Manager**). Another important issue is the ability of the system to suggest pursuit and evaluation actions to the teacher based on this student segments (**PPEM - Pedagogical Pursuit and Evaluation Manager).**

Actually there are several initiatives to develop a metadata standard that are to be used to get knowledge information from a system independently of its internal configuration. Thus, in order to offer contents from the intranet as well as from de Internet, developed tools must be based on those new metadata standars, for instance: **Dublin Core**, **LOM** - Learning Objects Metadata- and **OAI,** for information exchange.

To sum up, the different developed modules of the system are the following:

- **IPSM:** Intelligent Pedagogical Segmentation Manager
- **IPAM:** Intelligent Pedagogical Action Manager
- **IeMM:** Intelligent eMail Manager
- **PCM:** Pedagogical Content Manager
- **PPEM:** Pedagogical Pursuit and Evaluation Manager

III.III. IT Platform

In order to accomplish the above mentioned functionality, this system is supported, as shown on Figure 1, by the following elements:

- Front-End:
    - Mobile devices
    - Modules to integrate other systems (i.e. virtual campuses)
    - User software tools (staff, teachers, alumni,...)
- Back-End:
    - Storage systems with different databases: alumni data, subjects data, teachers data,...
    - Servers
    - Security Profiles

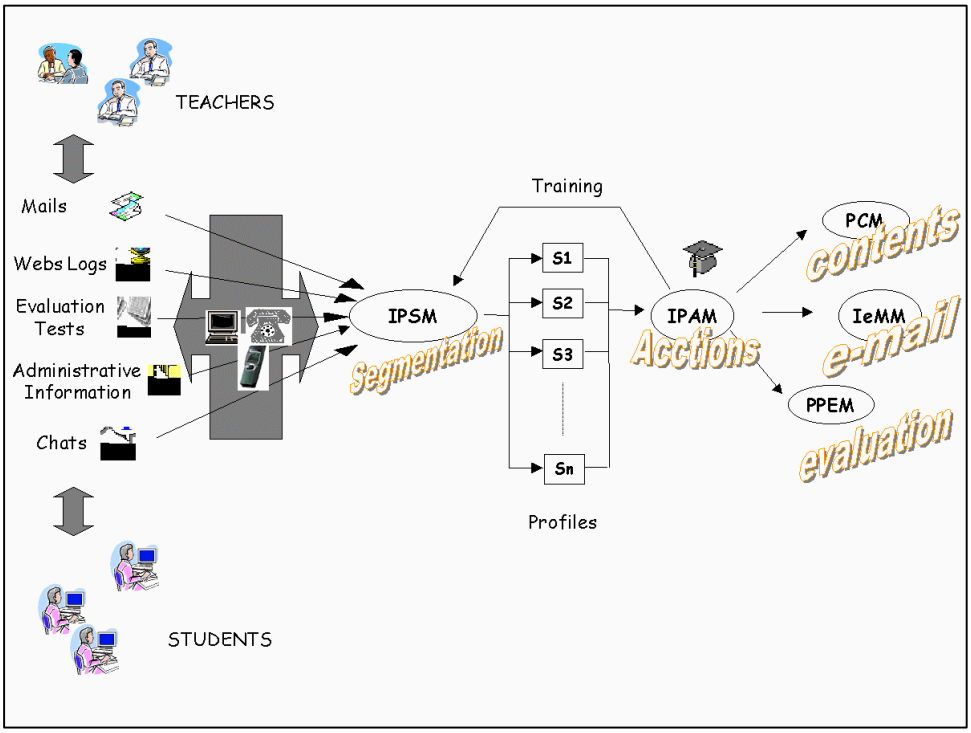

Figure 1. Work Scenario

III.IV. Processes

Throughout the whole system, one exemplary process could be:

- Transmission from any device
- System recognition of the device
- Alumni segmentation

- Detected actions:
    - Contents adapted to specific devices,
    - eMails according to contents,
    - And so on.

IV. CASE OF STUDY. WHY MOBILES TECHNOLOGIES

An important aspect of our project is **the study of the effects of new mobile services in the processes of distance education courses**. For instance, although technologies such as **WAP** are already completely developed and implemented in the commercial field, its use in distributed groups of students has not yet been sufficiently studied because, undoubtedly**, generalised access to these resources by students will contribute to saturate even more communication channels between teacher and students**. Naturally, the latter will receive teacher's mails anywhere at any time and virtually in real time. Nevertheless his/her capacity to answer (and therefore of overflowing) will also increase. In this sense special attention is also given to the analysis of new services offered by emerging technologies such as **GPRS** or **UMTS** that will need to be looked at within the methodology of work that we intend to offer to teachers. Because of this it is necessary to do continuous market research that would have the group up to date in the very latest developments.

Others devices that we are considering could be PDA devices such as Pocket PC and Palm Pilot; they are a growth area which promises to dramatically impact on the scene over the coming few years. This kind of devices combined with integrated mobile phones would be a great help, specially for teachers, and have to be taking into account in our project.

References

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