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Contents

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Summary of the day

The 8th OpenACS/dotLRN Conference was celebrated on November 4th and 5th, 2009 and it was organized by Instuto Tecnólogico de Costa Rica. The conference allowed to participating universities and organizations share its knowledge and experience in the building of community-oriented web applications using the Free and Open Source Software, in the fields of Education and Research.

The articles included in the conference shows how the universities and organizations focus their work to strengthen classroom education and distance education using social networking, collaborative concept mapping, and to improve the monitoring of student progress, in the university context.

Periodic conferences OpenACS/.LRN brings together universities and organizations working with the development toolkit OpenACS and the e-learning system dotLRN to promote collaborative development and improvement of services and applications that these platforms offer.

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Conferences

.LRN Blocks Planner, Assessment & Evaluation

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Abstract

The Blocks Planner is an interface to organize the content of the Courses, the content can be organized in a weeks or topics format, all the activities/resources in the course can be linked using the planner.

A new set of activity types are defined to use the current activities/resources in different ways with a default configuration, giving them a more specific focus, this will give the teachers an easier way to use the activities with expected configurations.

For some of the activity types assessment is now integrated with evaluation to have assessments automatically linked to evaluation's grading system, the information about the activity in evaluation is defined by the assessment and can only be edited through the assessment interface, this will make the assessment part of the course grades and to be displayed in the reports.

Assessment and evaluation have been improved to manage the new type of activities, the edit interfaces are now consistent with the configuration set by the activity type, the assessment and evaluation admin interfaces are now linked, assessment has a new interface to send the grades from the students sessions to evaluation.

Keywords

blocks planner, assessment, evaluation, new activities, organizing, courses, integration

1 Introduction

In an educational context for a course environment there needs to be a right set of tools that will help the teachers to prepare their course material, depending on the courses the needs might be different and for that it is always good to be able to configure the resources available to suit the needs of the users.

2 Blocks Planner

The blocks planner is used to display all the activities using the time or topics format, all the courses use the planner. It works by integrating all kinds of activities or resources of a course to a simple interface where everything is treated by the object id no matter what the object type is, and creating a new behavior to the activities according to the object type.

2.1 Organizing a course content

The blocks planner helps a teacher to create the activities for the course, there are many things the teacher needs to configure in order to create the environment they need, most of the activities they need are already there and providing them a way of having templates for the most common activities will simplify the process of configuring the courses content.

3 New activity types

The planner originally used to link activities and object types using the acs_object_type fields, sometimes the teachers need to have different types of configuration for the activities, creating a way for using some default configurations will simplify the way they fulfill their needs.

The new activity types are created using some of the activities available in the course with a default configuration, in some cases there is a special behaviour for a specific activity type.

To manage this new information the planner needs to change the way the information about the objects is displayed, now there will be an activity type that will have precedence over the acs_object_type, this means that the activities can be treated differently if there is an activity type defined for an object, there is an icon for every activity type to be able to identify the activities more easily.
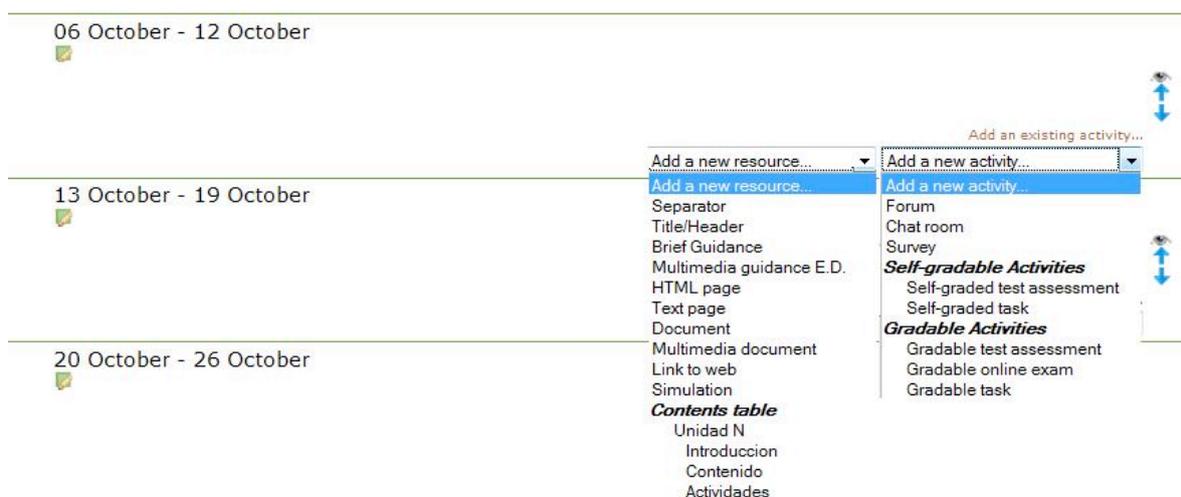
3.1 Relating objects to new activity types

Every object has its type already defined in the acs_objects data model, to be able to handle a different activity type on top of the objects there is a new table, every object can be associated with a new activity type with an entry in that table, the table has a reference to the community where the object is, the object identifier and the object_type.

Every new activity type is based on the existing activities with different configurations, to convert the activities there is an interface where there are sections for each activity type and the activities that are to be converted to any of those types.

3.2 Converting activities

If there is no entry in the new activity types table, the objects have their default type, and there is no default configuration for that activity, since the new activity types are the ones used in the planner, all the existing activities that might have been created outside of the planner need to be set with a new activity type, in some cases there is just one entry in the activity types table and set the correct settings, in other cases there is a need to create other objects besides doing the basic settings.

For every activity type, there is a list of activities that can be converted to that type, once an activity has a new type it cannot be converted to a different type because in some cases there might be inconsistencies with the configuration and the behaviours.

4 Assessment

With the new activity types there are some default configurations and behaviours for the assessments, the configuration for the activities is done at the time of creating the activity and is consistent in the edition of the activity.

The type of activities for assessment includes assessment with no grades, assessment with grades and/or start and end time, this means that some of the activities are created automatically to display the required fields and to prepare some default values for it.

The assessment package is one of the key packages in dotlrn, the only thing that the assessment package lacks is a way of managing the information and results in a better way to have more control in the course material, basically is to integrate all the assessments results with the course grades reports.

5 Evaluation

With the new activity types there are some default configurations and behaviours for the evaluations, the configuration for the activities is done at the time of creating the activity and is consistent in the edition of the activity.

The type of activities for evaluation includes tasks with no grades and tasks with grades, this means that those two type of activities are pre-configured at the time of creating them, the fields that are set by default are disabled when using one of these types.

6 Linking Assessment with Evaluation

There are some activity types that involve a link between evaluation and assessment, the assessment package provides a type of assessments with grades but there is no grades reports and there are no ways of managing that information for the course general grades.

6.1 Link an assessment with a task

Some of the new activity types are assessments that have an task in evaluation with the same information where the grades of the sessions of the assessments will be held. All the details about the assessment and the task are synchronized automatically, the interface for editing the task links to the assessment edit form and there is no way of changing the task information separately.

For the activity types that link assessment and evaluation, at the time of creating the assessment a new task is created, for this there are some fields needed to create the task, those fields are displayed in the assessment create/edit form and the task is created in the submit section.

There is a new table to link one assessment with one task, there is a field for the assessment item and one for the task item, that way the two objects can be linked, there is a set of procs defined to be able to get the information about this relationship.

In every interface for the tasks there are some changes to link the task actions with the assessment, the link to edit the task will redirect to edit the assessment, the link to view the task details will redirect to take the assessment. When an assessment is linked with a task in assessment there is a link to view the grades report and one to send the grades.

6.2 Send assessment grades to evaluation

Every time a student takes an assessment if the questions are automatically graded the score is transferred to the task automatically, otherwise it will be transferred when the last question is manually graded, every time a question grade changes the score is sent again to the task

There is a new interface to send the grades of all the student's sessions, there are bulk options to send all the grades using a defined criteria, the grades can be send by the best grade or the average of the grades sessions.

	NAME	Sessions	Best Grade	Average	Send Grades
☐	Student, Demo		80	70	Best Grade / Average

Submit Best Grade   Submit avarage

7 Other activity types

In the planner there are other new type of activities, it is the same as the assessment and tasks, there are existing objects with a different configuration or behaviour.

The file-storage objects now have different types of files that will display the object in a specific way with a special icon.

There are labels available as objects for the planner, for this labels there are different types that will only have a different icon, this is only to use as reference for the students.

There is always a way of extending this object types, there are procs that have all the things that need to be implemented in order to define a new activity type and the wanted behaviour needs to be programmed when there is an activity with the new type.

8 Conclussions and Future Work

The integration between the dotlrn packages gives the students a best environment to prepare their courses more easily, the planner helps a lot to configure templates for the activities and to bring all the available resources together.

Currently there is a template for the courses that meets the needs of the educational staff but there are many ways of connecting the resources available and there are ways of improving everything to meet the emerging needs.

Management of Grades in Virtual Classroom Platform .LRN

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Abstract - The main aim of this paper is to show you the new features development in the tool CARDS. This tool has been completed in the project "Management of Grades in Virtual Classroom Platform .LRN", allowing the professors to create complex evaluations methods.

A few years ago the evaluations of students were really easy. The general objectives of the courses were many attending lectures and a final exam to pass de course.

Nowadays, the new learning process promotes the student's personal work. They are responsible for his own learning. The students have less lectures and final grade has different options to be passed. The students are allowed to choose the best way to pass the course. For example, the students can decide if they want to pass the course doing many activities and one single final exam. On the other hand, they can try to pass the entire course doing one hard final exam.

In short, the evaluation of students is becoming more complex. The new tool allows the professors to design the different ways that one student needs to pass the course. If the student has not passed the chosen way, the system is going to change automatically to another alternative way.

KEY TERMS

E-learning, ICT, Open Source, LMS, dotLRN, Evaluation management, Online examination

INTRODUCTION

The development of information and communication technologies (ICT) has generated new needs in the students (Lee & Owens, 2000), (Wong, 2003). In particular, students need current knowledge and specific skills readily applicable to their potential professional area (Marqués, 2008). Also the learning support materials have evolved through the development and use of ICTs, what have opened a vast field for training. All these changes have led to a redefinition of the teaching and learning process (Pallof & Pratt, 2003), which is essentially collaborative and the student participates more actively on it.

Currently the process of incorporation of ICTs in higher education has been completed. Most European universities have a learning management system (LMS) where their courses can be studied (Barajas & Gannaway, 2007). Moreover, many of them are based on Open Source tools. However, the proper integration means to achieve a practical system of education that incorporates both the best technology and the most appropriate teaching techniques (Zurita & Ryberg, 2005). That is, content and methodology must be adapted to the new support (MacDonald & Thompson, 2005). So that, the European Higher Education Space (EHES) recommendations will be followed: more student participation in a collaborative teaching and learning process with real quality (Brooks, 2003).

Therefore, the adaptation and growth of an open source LMS cannot be made from simple development of additional modules, but requires a thorough analysis of its use. This analysis will serve to detect what are the functionalities more used or also more useful to improve the learning process and the educational quality. In addition, this study shows which tools should be modified to facilitate interaction between users (Colla, MacDonald, & Thompson, 2005), (Thompson & Randal, 2001).

In the particular case of the University of Valencia (UV) this study was performed after two courses of use of its Open Source LMS (This period was considered the implantation phase) (Moreno-Clari & Cerverón-Lleó, 2007). The analysis included a use comparison of main functionalities with a university of similar size and characteristics, but which had introduced its platform a year earlier (greater maturity in the implementation). The main objective was to identify the modules that needed to be improved. Based on the comparative results two modules were decided to be improved to adapt them to new needs for students monitoring and evaluation. These modules were the Activities one, which was used to manage and evaluate the homework, workgroup, practical classes, and continuous evaluation and, the Assessment one, which was used to create online examinations (Cerverón, Moreno, Cubero, Roig, & Roca, 2007).

This chapter presents the implementation of a tool for continuous evaluation and management of notes and their integration into the existing LMS with the possibility of reuse on any platform based on dotLRN Open Source software.

First, the background, starting point, and the events that led to the developments are outlined. After, the two tools implementation is described, including the analysis system, research design, and results of integration. Always keeping in mind that the results can be generalized to other university Open Source systems. Finally, some lines for further research are outlined and the conclusions of this work are exposed.

BACKGROUND, STARTING POINT, MOTIVATION AND METHODOLOGY

The University of Valencia was one of the first Spanish universities that started different strategies of change and modernization, not only of the structures but also of the teaching method, following the new challenge brought by the European Space for Higher Education (ESHE) (Moreno & Cerverón, 2007). A new plan was developed to improve the ICT use and to enhance the students learning process by involving them more directly. On the other hand, in order to standardize the available technological tools and promote their use by the whole academic community, all the tools where unified on a single platform. This platform provided a unified management of the learning process and communication between groups and communities (Cerverón & Moreno, 2006).

After a careful analysis of commercial and open source products, the university joined the dotLRN project and personalized the product for the specific needs of the institution (academic year 2004-2005) (Essa, Cerverón, & Blessius, 2005). dotLRN is based on Open ACS and is already used by other large universities in the world and supported by a large active community working on its development (Santos, Gonzalez-Boticario, & Barrera, 2005). As the tool is based on Open Source (Raymond, 1999), (Perens, 1999) is easier to adapt it to particular situations, not only from an organizational point of view but also from a pedagogical one. Even new modules can be developed and added to the platform. This resulting platform was called Aula Virtual and is currently used to provide a number of functionalities for each module taught in the University (e.g. a document repository, an event calendar, a news section, the possibility of creating forums, e-mail and chat services, support for notifications, submission of homework, a repository for learning objects, an application to create Web presentations, weblogs, a photo album, and a FAQs section) (Cerverón et al., 2007).

The use of this LMS also provided a new method to plan and evaluate the use of virtual learning in the daily lecturing process following the criteria set up by the ESHE (CCU, 2006). Technological cooperation was also promoted by working together with the developing community. In addition, pedagogical cooperation was enhanced due to the reuse of lecturing material by using methods based on standards.

From the beginning, the University of Valencia has actively taken part of the developing community of the dotLRN platform and the OpenACS architecture (Moreno, Cerverón, López, & Roig, 2007) by improving functions and correcting bugs, like in the Chat module. The user interface was also translated and new modules were created based on the demand of the academic community. As an example, a module called "Fichas" or cards (Soler-Lahuerta, Cubero, López, Roig, & Roca, 2005) was developed. This new functionality provides the lecturer with all necessary information of the students, including a picture. Information like marks and personal notes can be added. The notes can be seen by both, the student and the lecturer, or only by the lecturer. This functionality was integrated together with the Activities, a module used to manage the submission of homework. This integration improved the Activities functionality. An example of this "Ficha" or card of a student is shown in Figure 1.

Figure 1. Personal ID card

In parallel with this improvements and once the platform was definitely set up (academic year 2005-2006) the statistical data of use was analyzed. The target of the analysis was to find out the evolution of use of the platform and to detect possible errors. This analysis would provide useful information to correct the errors and improve the overall learning process. The analysis (Stevens, 1999) included a comparative study of the use of the whole platform and its different tools in two different universities which use the same LMS: dotLRN. The compared universities were the Galileo University of Guatemala and the University of Valencia (Spain). Both have a similar number of students and lecturers. The Galileo University has one more year of experience on the dotLRN platform, which could lead to make conclusions about the future evolution of the use of the platform in the University of Valencia.

Table I. Comparative Study of the Use of Tools In the University of Valencia and the Galileo University of Guatemala

USE OF TOOLS	UNIVERSITY OF VALENCIA	GALILEO UNIVERSITY
DOCUMENTS	39%	46%
FORUM	5%	8%
MAIL	25%	9%
NEWS	25%	1%
ACTIVITIES ASSESSMENT	5%	36%

The comparative study of the use of the different tools shown in Table I demonstrated that although the most used tool on both LMS is the documents repository, the largest differences can be found in tools like Activities and Assessments. In the University of Valencia Activities functionality is used to manage the submission of homework, the marks, and notes of the students, while the Assessments one to create online examinations. At the Galileo University the use is 36%, but at the University of Valencia it is only 5% (Hernández, Morales, De la Roca, & Guerra, 2006). The reason for this difference can be not only the one year delay in the implantation of dotLRN at the University of Valencia, but also due to the fact that the Galileo University relays more on a non presential learning method, and therefore needs more help from these technological tools. This analysis led to a new project, which developed two new tools to evaluate the students' work in a continuous way. In one hand with a project which main objective is to improve the Activities module) and to create online examinations in a more efficient manner and on the other hand with a project which main objective is to improve the Assessments module, as it was suggested by the ESHE. These new tools should be integrated on the existing ones. They also can be integrated, if desired, on any LMS based on dotLRN due to its Open Source characteristics.

IMPLEMENTATION OF MANAGEMENT OF EVALUATIONS TOOL. INTEGRATION WITH ACTIVITIES AND CARDS PREEXISTING FUNCTIONALITIES

The functionality to implement and manage continuous evaluations was deployed to fit with the existing modules of Activities and Cards, also developed at the University of Valencia. This new tool allows organizing the whole evaluation process, defining the tasks to be fulfilled, and their

relative weight in the overall grade. Also, it takes care that the tasks, homework, class expositions, practical classes, etc., are delivered in time, and gives the chance to set up a complex equation to calculate the final grade of the student (Cubero, López, Roig, & Roca, 2006). The improvements with respect to the old tools are two new options: setting up complex evaluation processes and taking care of different evaluation chances available.

In this case, the advantages provided by the open source are used to enhance existing tools, - the Activities one (which was used to manage the submission of homework) and Cards one (which was used to save the information, notes and grades of the students) (Fig. 1), based on the results of the analysis done, and in order to reach the objectives fixed by the ESHE. This implementation has been made by defining a new algorithm that allows setting up the new complex evaluation processes. Additional improvements like exporting the grades in digital format and the delivery of personalized files to the students (their corrected examinations), have also been added.

It is clear that evaluation processes can be very different from one subject to another, not only depending on the subject but also on the lecturer (I JORNADAS AV, 2006). Therefore, the first step was to collect flow diagrams of as many subjects as possible, from technical studies but also from other type of studies. After reviewing all the potential evaluation possibilities, the new algorithm was set up and defined. Then, the new management of evaluations tool was developed in the Open ACS standard, and maintaining and taking advantage of the existing functionalities (Activities and Cards). Also based on the lecturers demand, new possibilities like the file delivery, were included.

The project for implementing this tool in the University of Valencia LMS was divided into two phases. During the first phase the algorithm design was made, based on the flow diagram of different evaluation methods. Then, the algorithm was programmed and integrated into the LMS.

Algorithm design

Evaluation methods are usually based on grades applied to different blocks (like theory or practical part), which can have different weights in the final grade. Each block can be set up by diverse tasks and there can exist also conditions, which have to be fulfilled by the student to pass from one task to the next one. These evaluation methods are used in most of the University of Valencia courses, not only in technical subjects, but also in the humanistic ones there is a practical part, named laboratory. In this practical block students apply to real life cases the concepts they have studied in the theoretical blocks. Nowadays, ESHE challenges base the learning and teaching process on skills that students must reach. These skills are not only on knowledge, but also on abilities and attitudes. Abilities and attitudes can be achieved in the practical or laboratory part of the subject.

To illustrate an instance of the Activities functionality improvement, this paper exposes a practical implementation of a subject evaluation. This subject has enough variation to show how the algorithm can reflect and evaluate any subject in Higher Education. Figure 2 shows the example of a subject called TCAD, which has two blocks: theory and laboratory (or practical part to achieve skills on abilities and attitudes), both with the same weight (50%) at the final grade.

After the theory has been explained the students have to pass an exam (February Exam Theory) which if not passed can be repeated at the end of the course (June Exam Theory). If it passed, the student keeps the grade of the first exam or the grade of the second one if he passes it at that time.

At the same time the student has to fulfill three practical tasks in the Lab and to attend a minimum number of Lab sessions. The weight of each task is different and increases as the practical assignments become more difficult. The final grade is the mean value of the Theory and the Lab grades. The Lab grades would be calculated from the weighted mean of the grades for each of the tasks. If the student is unable to attend the Lab he/she can choose to make an exam on the contents of the Lab (June Exam Lab), which is equivalent to the three different tasks. If a grade is greater than 5, it means that the pupil has passed the task, exam or subject considered.

Attendance to the lab sessions is also compulsory up to a given percentage. If this part is not fulfilled then the student has to pass the lab part through the exam instead of the three tasks. But Attendance is only a condition, which does not affect the final grade.

It seems clear that the student has at least two different paths to pass the subject. These paths are depicted in the flow diagram.

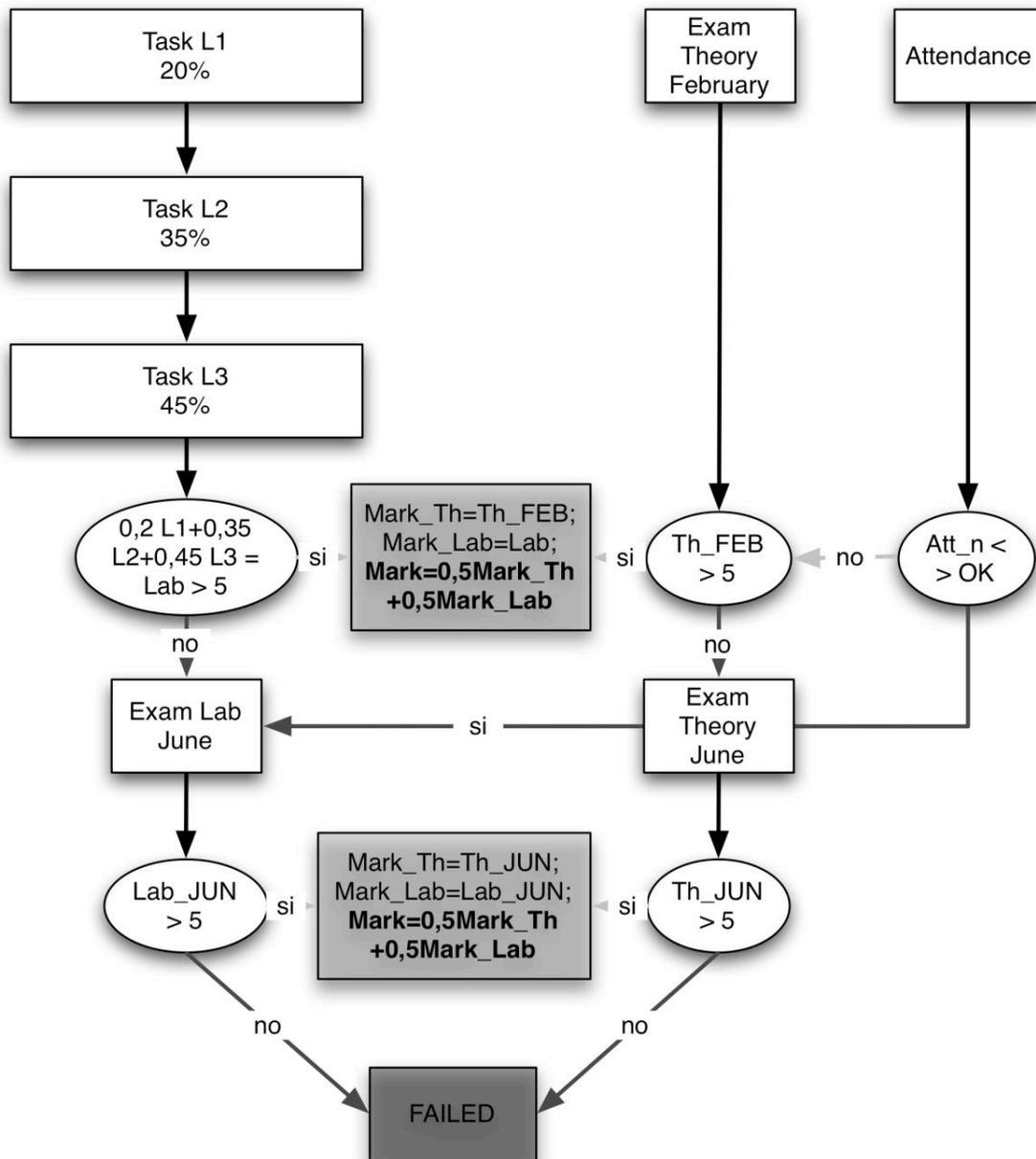## Evaluation of Subject TCAD

Figure 2. Flow diagram for the evaluation of the subject TCAD

Therefore the concept of "path" of passing the subject is the base of algorithm.

This evaluation process is also used in other subjects, specially the definition of two parts of a subject usually called lab and theory, which are very common in technical and scientific studies.

The new algorithm applied to the Management of Evaluations (or improved Activities) module of the dotLRN platform translates as follows:

A new type of block has to be defined, which will be called weighted and selected. Then, as part of the final and total grade, the lecturer can set the weight of the tasks which form the block and he/she can select whether this grade contributes to the final grade or not depending on which way the student chooses to pass the subject. This selection also depends on the grades the student obtains for the different tasks and exams. A screenshot of this set up once programmed into the application is shown in Figure 3.

N°	Block ▲▼		Task name ▲▼	%	Max. Grade	Date(AAAA/MM/DD) ▲▼	Edit	Delete
1	Attendance		Att#1	auto	1	2009-05-14		
2	Attendance		Att#2	auto	1	2009-05-14		
3	Attendance		Att#3	auto	1	2009-05-14		
4	Attendance		Att#4	auto	1	2009-05-14		
5	Attendance		Att#5	auto	1	2009-05-14		
6	Laboratory		Exam L June	100	10	Not date		
7	Laboratory		Exam L September	100	10	Not date		
8	Theory		Exam T February	100	10	Not date		
9	Theory		Exam T June	100	10	Not date		
10	Theory		Exam T September	100	10	Not date		
11	Laboratory		L1	20	10	Not date		
12	Laboratory		L2	35	10	Not date		
13	Laboratory		L3	45	10	Not date		
14	Laboratory		Media	0	10	Not date		
*	Theory ▼			0	10.00			

Figure 3. Tasks (Attendance 1-n, Exam L June, L1, etc.) defined in the different blocks

The algorithm set up not only includes the new type of block called weighted and selected, but also a new tool which automatically selects the different grades of the tasks to compose the final grade based on several conditions. These conditions set up the path of passing the whole subject. It is based on the different tasks the student has passed and it reproduces the flow diagram (see Figure 4).

Selection Blocks

N°	Block name	Manage path
1	Theory	Configuration
2	Laboratory	Configuration

Conditional evaluation Laboratory: *Conditions of block Laboratory*

Path list

Laboratory

Order	Target task	Condition	Next task if target task is passed	Next task if target task is failed	Edit	Delete
0	L1	Grade of L1 >= 0	L2	Exam L June		
1	L2	Grade of L2 >= 0	L3	Exam L June		
2	L3	Grade of L3 >= 0	Media	Exam L June		
3	Media	(L1*0.2)+ (L2*0.35)+ (L3*0.45) >= 5	-End-	Exam L June		
4	Exam L June	Grade of Exam L June >= 5	-End-	Exam L September		
5	Exam L September	Grade of Exam L September >= 5	-End-	-End-		
6	Exam L June ▼	> ▼ 5	Exam L June ▼	Exam L June ▼		

Figure 4. Set up of the different conditions (paths) to compose the final grade of the student

Programming the algorithm and new options

The second phase of the implementation of the Management of Evaluations tool, which will be integrated in the preexisting Activities module, is to program the algorithm. The code was based on TCL (Tool Command Language) (Fuente, 2006), (TCL, 2008), JavaScript, and HTML. The LMS database is based on PostgreSQL (Hillar, 2006).

At this section, once the new Management of Evaluations or Improved Activities module has been finished, the way to define the evaluation process established in the flow diagram of Figure 2 is explained.

First, the lecturer defines the different blocks, which are going to be evaluated by a given grade, and that all together compose the final grade of the subject. Usually the type of the block will be the most general one, which is weighted and selected. For the representative example in the chapter three different blocks are defined: theory, lab, and attendance.

The next step is to configure all the tasks that form each block together with their different attributes. In the example: the compulsory session the student has to attend, the three tasks (L1, L2 and L3) he/she has to deliver from his work in the lab with its weight (20%, 35% and 45%) and, finally the different theoretical exams the student has to pass (see Figure 3), are set up.

After that, the paths have to be set up. All the different conditions, which define the final grade, have to be defined in the right order. In the example, this means to calculate the weighted mean of the tasks that compose the lab grade. If the result is smaller than 5 then the student has to make the exam for the lab. For the theory, the student has to pass the February exam and if he/she fails (grade less than 5) then has to repeat the exam in June (see Figure 4).

It is possible to set up an evaluation path for each block. Finally, the grade of the subject is calculated from the mean value of the grades of each block.

When the student evaluates a block, the lecturer applies the conditional calculation and the program chooses the right grades to calculate the resulting grade of the student (see Figure 5).

Figure 5. Evaluation state after the ways algorithm is applied. On the right in the column "Active" it can be seen that not all grades are selected

FUTURE RESEARCH DIRECTIONS

Comparative analysis made at University of Valencia also showed that Documents was the more used tool. Nevertheless, dotLRN has not the possibility of dynamic content creation, which could be visualized and edited at the platform. For that reason, at present, an active collaboration between two dotLRN Community members, University of Galileo of Guatemala and University of Valencia, is maintained, in order to create a content creation tool for Learning Objects, related to the dotLRN LORS package. The use of this package will allow creating adaptive and collaborative learning models. On another hand, it will allow creating re-usable contents not only in different courses and groups of one institution, but also in other LMS. This interoperability will be guaranteed by using standards in contents creation.

It can be mentioned some short term objectives of this collaboration as it can be: to provide a simple interface to create web pages, and easily include and manipulate web assets such as flash, videos, images, etc.; to provide a set of web templates, easy to manage, like PPT templates; to provide collaborative content creation tools while being able to set up roles easily; which has folder, subfolders, pages ordering and is free of "standards" approaches, so professors with basic text edition knowledge can use it. If the created tool will use already existing content creation tools, it is important try to keep it as customization rather than a fork. Mid and Long Term objectives have been also fixed. Some of them are: to automatically export to SCORM or IMS-CP; to import and publish to LORS with one click feature; to define workflow ; and to integrate third parties API or resources as it can be Flickr, Google, Amazon, YouTube and others.

To reach the objectives, the way is to start making a full review of the tools available, possible approaches, etc; and to build a prototype that gets near to the short term objectives. The start point has been an in depth study of such type of tools: XOWiki, LORSM, LORS Central built-in editor, etc…

Other Future Research directions, always keeping in mind the main objective of improve the University of Valencia's LMS, are to integrate the Multimedia Server of the university with the platform to catalogue the Multimedia Server contents to use and reuse them as Learning Objects; or to integrate a Synchronous Learning Software based on Open Source, as DimDim or OpenMeetings, to improve the academic community experience and the learning and teaching process.

CONCLUSION

The convergence process towards the ESHE has changed the universities subjects' evaluation process. Now, less weight is giving to the examinations. It is due to the fact that the new introduced learning ways evaluate the student daily work instead of a single test mark. This leads to the definition of a set of tasks to be fulfilled by the students and evaluated by the lecturer. These different tasks can belong to different blocks and can have different weight in the final mark. The student can also choose between different evaluations tracks to reach his/her final mark. Therefore he/she needs to know what is the value of his/her mark in a given moment of the semester. All these issues must be considered when developing the new software tool of Manage Evaluations which has been integrated into the Activities and Cards functionalities of the University of Valencia LMS and simplifies all this work.

After the new algorithm had been set up, the new program of Manage Evaluations was developed and tested with the different flowing charts deployed for all different evaluation processes. All were successfully reproduced with the new software tool. Therefore, almost all evaluation processes of the University of Valencia can be set up with this new tool. With the old Activities tool not all the possible evaluation processes could be set up, and therefore lecturers, which had interest on its use were unable to manage it and did not stick to the dotLRN original module.

Right now, the new Manage Evaluations tool is already installed on the LMS development platform and the Computer Services Office is testing it to deliver a bug free version to the academic community. At the beginning of academic year 2009-2010, it will be provided as an option and everybody will be able to use it. Of course, the developing will continue to further improvement of the tool.

Finally, it must be said that these new tools is implemented on an open source LMS and therefore, can be used in any other higher education institution which uses dotLRN. This fact also improves the cooperation with the open source community (.LRN and OpenACS). Any kind of large problem can be split into smaller problems and solved by small working groups. This allows the improvement of tools like dotLRN (Moreno et al. 2007). In the future, it is intended to continue the cooperation with OpenACS (Hernández, 2005), dotLRN (dotLRN, 2009), the E-LANE project (ELANE, 2009) and the INNOVA group of UNED (INNOVA, 2009) to share experience and reach new objectives.

With this development, it is expected that usage rates for these recently improved modules: Activities and Assessment are increased, and lecturers are encouraged to make use of these tools.

ACKNOWELEDGMENTS

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OpenACS/dotLRN integration with ITCR platform

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Abstract. This paper describes how The Instituto Tecnológico de Costa Rica carried out the OpenACS/dotLRN integration with the internal service platform develop in ASP.NET tecnology, this allow the creation of new features and tools for students, techears and administrative staff. In general we explain the process to implement OpenACS/dotLRN and how it became in TEC-Digital, also we present a view of the architecture, the implemented technical aspects, the services offered to the institutional community and future work.

Key words: Web Services, Integration, dotLRN, OpenACS, ITCR

1   Introduction

The Instituto Tecnológico de Costa Rica (ITCR), has attempted to optimize the academic processes, such as admission of new students, enrollment, among others, by the application of Information and Communication Technologies available, which led to the development of the tools used by administrative staff of the Admission and Registration Department (DAR).

Currently the number of students enrolled in the ITCR has grown considerably, thus requiring further administrative applications, accessible not only by DAR staff, but also by other institutional departments staff. That is why it was necessary to establish a development standard, which was developed by the Computer Center (CC), which also is responsible for installing and maintaining the hardware required for the proper functioning of the developed applications.

The development standard is based on proprietary software, for example it's oriented to Microsoft® Windows® Server as operating system, Microsoft® SQL Server as database administrator and Microsoft® Visual Studio .NET as development platform.

The Admission and Registration Department in collaboration with the Computer Center have developed a set of methods to consume data widely used by various applications via web services (WS), in order to standardize their use and avoid duplicating code.

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1.1 Related Work

In addition to strengthening the academic processes, the Instituto Tecnológico de Costa Rica sought to improve communication between teachers and students, for that reason initially it was used the TEC-Virtual service, an implementation of Microcampus web site installed in 1998, that allowed to share documents, important notes, among others, published by teachers.

Now the TEC-Virtual lacks many of the features available in the most recent Learning Management System (LMS), which coupled with technological constraints inherent in the platform caused a change in the technology used, hence the TEC-Digital project was born.

1.2 Motivation

The TEC-Digital is an ambitious project aimed at first instance to provide one unique service for students and teachers in order to access their personal information, academic and/or teacher record, and most importantly to their related courses in different academic periods.

2 Why OpenACS/dotLRN

The responsibles of the project evaluated Moodle, Sakai and dotLRN as Learning Management System (LMS) platforms, the selection of those platforms were based on LMS list description [1]. The main issues compared were:

2.1 Technical staff

Database: Postgres as database engine is more robust and stable than MySql, the support to stored procedures, indexes, cursors, transactions and scalability are really very important things to consider [2].

Web server: AOLServer as web server: it is good to know the number of attacks for hacking, and AOLServer is one of the more secure web server.

Language support: TCL is not a popular programming language, but when it is used in combination with the OpenACS toolkit the productivity in solutions delivered is considerably positive.

Scalability options: considering PostgreSQL and AOLServer, the support for clustering on database and web server, and the support of pooling connections to the database and the multithreading are conditions very important to consider for planning the future scalability.

2.2 Interface

Facility to use: the LMS's compared are really easy to use and they have intuitive interface.

Interface design: the interface design are different, and considering that web interfaces using ajax are not so popular when those LMS were designed, the interface could be improved in all of them. However the dotLRN standard interface, using the Zen theme, is a clear interface.

Functions supported: in general all LMS support the same functionalities [3]. The comparison of functionalities is not the most important issue to consider.

2.3 Support to virtual communities

For ITCR every research project requires an easy way to publish results, and to generate virtual spaces to collaborate, so communities support is a very strategic option. Some comments and argues received were that installing Moodle plus Joomla the solution is completed, but you have two different solutions, and authentication problems. dotLRN provides LMS and virtual communities integrated.

2.4 Institutions using the LMS

ITCR were looking for an integral solution, with the capability to be applied in the whole university, integrating internal solutions. The dotLRN support for departments is an important advantage helping to integrate the LMS with the real requirements as an institutional platform.

2.5 Development time:

This issue is very difficult to know before implement any LMS and adapt it to the university, buy the ITCR experience has been very positive. The programming team, compound by 6 junior programmers, implemented Student's Profile, Teacher's Profile, Careers visualization, institutional databases synchronization with dotLRN database, creation of virtual communities for each department, and other applications in 5 months ready to start real testing. This could be taken around 12 months with other commercial programming platform.

3 OpenACS/dotLRN integration

The dotLRN is a open source E-learning system distributed under the GNU Public License (GPL), allowing the necessary changes to suit the specific needs of ITCR, like those included into the visual design of the website and the incorporation of new authentication methods.

TEC-Digital uses dotLRN stable version 2.4.1, compatible with the Web server AOLServer 4.5, and the Database Manager System (DBMS) PostgreSQL 8.2.10, installed on the operating system GNU/Linux Debian Lenny 5.0.

Tools such as: Teacher's Profile and Teacher Indicators need information about teachers and students, which is managed by the DBMS Microsoft® SQL Server.

For that reason it was necessary to establish a method to allow access to that information from the TEC-Digital.

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3.1   Architecture
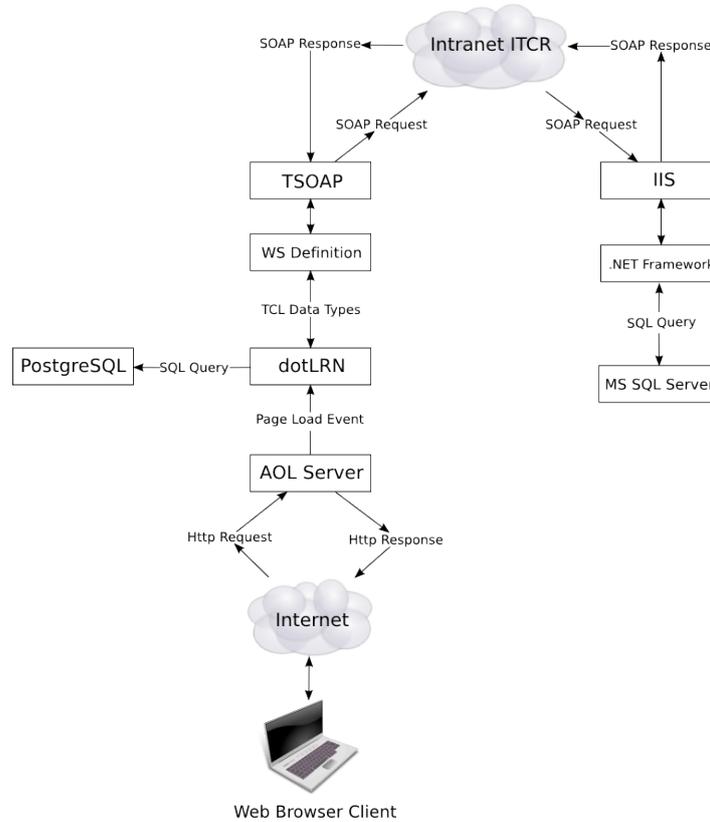
Fig. 1. Architecture and communication protocols used to consume web services

dotLRN with the right modules can create pools for databases compatible with MS SQL Server and Sybase, but it was decided to use web services, that allowed to obtained some advantages:

Availability: Web services developed and published by the Computer Center included many of the necessary queries. In addition, the CC was on disposition to collaborate with the development of new queries.

Interoperability: Web services use protocols reviewed by the World Wide Web Consortium (W3C) as Extensible Markup Language (XML) and Simple Object Access Protocol (SOAP).

Security: Permissions on web services are assigned by IP Address[1], so only specific servers can query. Thus an user database is not required.

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[1] Numerical label assigned to devices participating in a computer network

Response Time: The protocols used are simple so the time needed to process the response is minimal.

Web services are developed using the .NET Framework and are published through the Internet Information Services (IIS), in order to consume them from dotLRN it was required to install TclSOAP, an extension of the TCL programming language that provides the necessary commands for SOAP remote procedure calls.

Moreover the dotLRN package tsoap was installed. It's include the method *SOAP::create* used to define methods that will be invoked to generate and send SOAP request, to interpret SOAP responses and to return TCL data types, such as lists, integers.

The developed applications, including: Student's Profile, don't make SOAP requests directly. They do it through an intermediate layer, called WS Definicion, which defines a TCL procedure for each web service used. The figure 1 clearly shows the layers involved, and the protocols used for exchanging data between them.

3.2 Technical Aspects

.NET web services use many parameters that allow null values, but the TCL language does not have support for them, therefore they was not considered in the development of the tsoap package. The method *SOAP::request* was modified in order to recognize a keyword like the null value, and to include the SOAP attribute *xsi:nil*.

4 Features and tools developed

For the success of the TEC-Digital project, it was necessary to improve the services that were available through out the TEC-Virtual platform, and offer entirely new applications. So the efforts were focused on developing key tools, which are described below:

4.1 Automatic creation of User Accounts

To use TEC-Digital, students or teachers must have an user account approved by a TEC-Digital administrator. The dotLRN platform allows interested persons to request a user account, however this does not have a check on the accuracy of the information, such as student ID or username.

The best way to ensure the accuracy of the information is obtaining it from a reliable source, so the personal information about students and teachers is queried via web services, which allow to create and to approve the necessary user accounts.

All services offered by ITCR use a combination of an username and a password as access control. To maintain the same authentication system, TEC-Digital is has been configured to use an username instead of an email.

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The information on usernames and passwords are handled differently. For each student, the Admission and Registration Department assigns him a student ID and a password, called pin. For teachers and staff in general, the Computer Center uses an LDAP server to manage the usernames and passwords. Therefore, two authorities were created: "Estudiantes ITCR" and "Profesores ITCR", which redefine the Authenticate method, to perform the validation by calling the appropriate web services.

Since no students or teachers require to register by themselves on TEC-Digital, this option was disabled.

4.2   Automatic creation of Courses
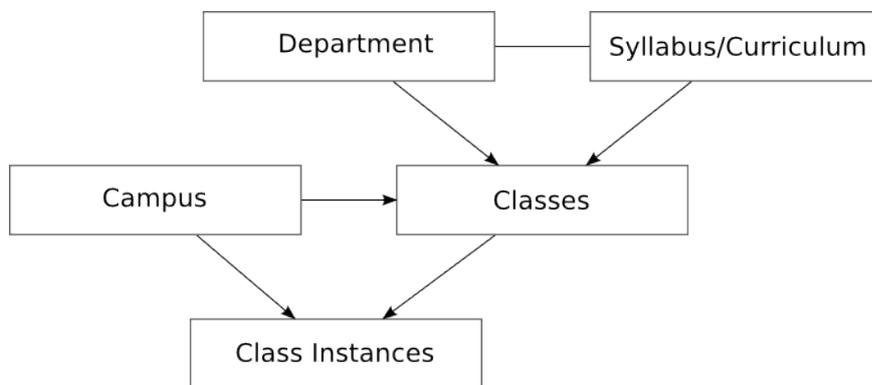
Fig. 2. Organization of courses used by ITCR

The figure 2 shows the organization of courses used by the ITCR, which is more complex than that the one provided by dotLRN, so it was necessary to make some changes to the platform in order to include concepts such as: Curriculum and Campus.

Weeks before to any term, the Admission and Registration Department has registered the Schedule Guide, detailing the open courses, schedule, and supervising teachers; which can be accessed through a web services.

Given the volume of information, nearly 1,200 courses per semester, it was necessary to develop a process to consult the Schedule Guide, to record important information about the campus, the departments, the curriculums, the courses; and to create a portal for each course.

Once the enrollment process is finished, the list of students is queried through a web service, so it update the list of members for each course recorded on the TEC-Digital. The teachers and students no needed to join the courses themselves.

It is important to mention that the described processes need to be executed regularly to keep information current.

4.3   Student's/Teacher's Profile

Both students and professors have information recorded about grades, courses, schedule, enrollment, statistics and general information in the ITCR's data bases. We built an application inside TEC-Digital in order to get easy access to that information by students and professors.

When a student login into TE-Digital, he or she can view a new tab into his o her portal with the name "Expediente Estudiantil" (Student Profile) and by doing a click on the name, the student get access to a new page where all its information can be viewed.

The student has available the next information: general information such career, address, photography, etc.; all the courses record, classes schedule, statistics and enrollment appointments.

In the professors' case, they view into their portal in TEC-Digital the "Expediente Docente" (Teacher's Profile) tab, and they can access: record of all the courses given, the list of students in the courses and the approvals rate of their courses.

4.4   Tools for Directors

Every career in the ITCR is associated to one school, and every school has a director who is the responsible for all the matters in that school.

The Directors of the schools needs to have quick access to relevant information of professors, courses, and students. The different directors of school should be able to make decisions for their daily management, but many times, this information is not the immediate reach or they do not know where to find it. A director should be able to obtain swiftly and quickly information related to the students and teachers associated to their school, and in addition to have tools to provide such information in a way intuitive and easy access.

The system provides to the directors of the different schools, a series of consultations of teaching type in an automated way, to enable them to have more academic and administrative information of students and teachers at his school, in order that information support in their daily management

The application has security profiles because one director only can view the information corresponding to its own school. The information that each director can view is stored in the database, and it is synchronized through web services.

Consultations and services available for directors:

Courses by professor: It permits to see all the history of courses given by a professor in the university, the list of students in the courses and the approvals rate.

Student Record: It allows viewing the same information that a student see in its personal student record.

Graphic curriculum: A director can view the progress of a student in the curriculum in a graphic way. Also in this tool, a director can view a description of the given courses in a determinated period and get per course all the information related to it.

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Enrollment utility: It permits to see all the courses and it information for the next enrollment period.

4.5   Teacher Indicators

In order to develop an integral solution that would facilitate or support decision making in teaching, a system as developed in order to integrate different information, both on the Admission and Registration Deparment, and Human Resources Department. From the information obtained, methods were created to effectively process and streamlined the data, resulting in new high-value information for decision making. Finally, this information is displayed using effectively visualization techniques to address the end user in make strategic decisions and measure performance based on different indicators.

The development of a prototype justify the creation of the business intelligence solution, by exposing the need for an application for taking strategic decisions and to explain the context where they apply the information and the Teacher Indicators.

The prototype contain a defined group of indicators, and it will allow working on them in a useful way to display information, graphics and make decisions that assist in creating strategic plans for the Instituto Tecnológico de Costa Rica.

The system has the next features:

1. Seven Teachers Indicators Developed: Approval Rate, Abandonment Rate, Total Freshman, Professor Record, Teacher evaluation per course, Annual Teacher Evaluation) and Number of groups per period.
2. The data if filter by spatial disaggregation and time disaggregation. The spatial disaggregation means that the data for a particular indicator is filtered by campus, department, course and professor. The time disaggregation means that the data for a particular indicator is filtered by year, modality and period.
3. Charts with information from the Report.
4. A view to print the report.
5. A file to export data to an excel report.

5   Future Work

1. Integrate CmapServer with TEC-Digital, in this way teachers could create evaluations using conceptual maps generated with CmapTools.
2. Create a game engine for evaluations and integrating this to courses and facilitating students use this for auto diagnostic on several topics.
3. Improve the administration module for dotLRN, making it more intuitive and user friendly. It will be based on usability analysis.

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Eduwiki for .LRN, educational tool using the XoWiki Framework

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Abstract. *This paper introduces Eduwiki Tool, this tool aim to add educational components within the model of the courses in .LRN. Eduwiki Application is an extension of XoWiki Framework [8,9], a Wiki-based environment for content management applications. The Eduwiki's primary focus is to provide the professor an easy to use tool, following the model of the different applications of .LRN, the tool aims to define Wiki learning activities, allowing the professor to define the type of Wiki activity, creation and editing permissions.*

This paper focuses on describing the requirements and technical aspects of the implementation of Eduwiki tool and especially its educational application.

Keywords: *Wiki, xoWiki, XOTcl, collaboration, e-Activities, e-Tivities, e-Learning*

1. INTRODUCTION

Collaborative creation and maintenance of knowledge tools is one of the emerging phenomena of online internet communities, as prominent examples such as Wikipedia.org, MediaWiki.org, LyricWiki.org, Microformats.org, Wikitravel.org, and so forth, have clearly demonstrated [20]. Moreover, a collection of web pages (a so-called Wiki) can be very useful for teaching and learning purposes, for instance if learners need to collaborate to work on certain topics or if facilitators wish to develop and share their learning content with others.

A Wiki Activity is a collection of collaboratively authored web documents, designed to facilitate exchange of information within and between team. Basically, a wiki page is a web page that any registered user within the course can edit directly from the browser, without needing to know HTML. A wiki starts from a master page. Each author can add other pages to the wiki by simply creating a link to a page that does not exist yet, or using the "New Page" link [5].

Wikis can be used for any type of activity, from repositories, websites, lists of Web links properly organized even the creation of encyclopedias. Wikipedia is the best known Wiki application online.

Wikis are used in different ways as follows:
- As an editor
- As a tool for learning
- As an authoring tool
- As a report writing tool
- As a link to other tools
- As a means of attributing contributions
- As a means of co-ordinating contributions

A Wiki can be used as an e-Tivity,   An e-Tivity is based on intense interaction and reflective dialogue between a number of participants, such as learners / students and teachers, who work in a computer-mediated environment. E-tivities are text-based and led by an e-moderator (usually a teacher). e-Tivities "are designed to engage online students in meaningful work that captures their imagination and challenges them to grow" (Salmon, G 2008) [1].

An e-Tivity has the following structure [1]:
- **Spark:** a small piece of information. (instructions, motivation)
- **Task:** the moderator asks participants to do an activity online.
- **Timeline:** the moderator, who orchestrates the whole process, gives participants a deadline to do the activity. This timeline is useful to organize work and make sure that all participants will complete it by the same time.
- **Respond**: participants are invited to read other participants' e-tivities and comment on them whenever the have something interesting to add or disagree with some observation; constructive criticism is a key aspect of online activities.

Wikis are used for educational activities as [2]:

- Wikis can be used to map concepts. They are useful for ***brainstorming***, and editing a given wiki topic can produce a linked network of resources.
- Students can add ***summaries*** of their thoughts from the prescribed readings, building a collaborative annotated bibliography on a wiki.
- Single-user wiki that allows an individual to collect and edit his or her ***own thoughts.***
- Wikis that allow students to keep ***notes online*** with the added benefit of allowing them to be peer reviewed and changed by fellow students. Creating a wiki for ***group lecture notes*** after a lecture gives students a chance to combine all their notes.
- Collaborative writing wikis can be used by a team for ***joint writing***.
- Students can use a wiki to develop ***research projects***, with the wiki serving as ongoing documentation of their work.
- A wiki can be used for publishing ***course resources*** like syllabi,handouts and links.
- Teachers can use wikis as a ***knowledge base***, enabling them to share reflections and thoughts regarding teaching practices, and allowing for versioning and documentation.
- Often group members ***collaborate on a document*** by emailing to each member of the group a file that each person edits on their computer, and some attempt is

then made to coordinate the edits so that everyone's work is equally represented; using a wiki pulls the group members together and enables them to build and edit the document on a single, central wiki page.
- A wiki can be used as a student *personal diary*.
- Collaborative *magazine* and *story telling*.

These activities give us a vision of the functionalities needed in a Wiki Application:
- Easy to use
- WYSIWYG editor
- Strong permissions system
- Notifications
- Full text search
- Revisions system
- Timeline control

From this educational activities two common scenarios can be defined:

Scenario 1: In this scenario, Michael, our teacher, wants to create a personal Wiki activity for his students. Activity's objective is to give each student a Wiki page, in this document, student can keep lecture notes and information about course contents, using summaries, conceptual maps, etc. Students can edit his own Wiki, but they can't read or change content for classmates Wikis.

Scenario 2: Michael, in this scenario, wants an activity to make a collaborative Magazine with an IT related approach. Michael organizes his students in groups of four. In this activity each group member can change his group's Magazine pages, check for changes made by teammates or get notifications for recent pages updates. Classmates may read Maganizes from other groups, but they are not allowed to edit information, moreover, Michael wishes that he can set a deadline for the activity, after this date, group members can't modify Magazine's pages.

2. STATE-OF-THE ART

Wiki tools for use in educational activities are part of several LMS [3], XoWiki is .LRN Wiki tool.   XoWiki is a Wiki implementation for OpenACS in XOTcl, XoWiki includes a rich text editor for easily creating and editing wiki pages and provides features for structuring, commenting, tagging and visualizing wiki-based content. Table 1 shows XoWiki main features.

XoWiki tool is easily implemented within .LRN context using **xowiki-portlet** and **dotlrn-xowiki** packages, these packages provides applets to be included in a course or community. XoWiki tool is widely used as an application within OpenACS, although in .LRN context inside a course it has some limitations to be used easily for an e-Tivity by a non-technical user.

Cross language links	Inclusion of ADP pages	Nesting of Wiki-pages
Customizable	Revisions system	Comments
Large set of includeable content (includelets)	Different appearances (template_file)	Web 2.0 gadgets (digg, delicious, my yahoo)
Categories	RSS	Weblog
Import/Export	Analysis of collaboration networks	Forms
Podcasts	Notifications	Tags
Named/unnamed pages	Varios security policies	User-tracking
Audio embedding	Full text search	Prototype pages

Table 1. XoWiki main features

One of the limitations to the non-technical users is that after the addition of XoWiki applet to the .LRN course, a main page is created but if teacher needs to manage permissions to each page or student, he needs several steps to use the management interface because it is a complex process to handle and has no facility to easily grant or revoke permissions to be used in learning activities context. Figure 1 shows the current permissions interface.

XoWiki has an advanced policy management system, using the XoWiki parameter: **security_policy** with value: *::xowiki::policy3*, teacher is able to grant privileges per page. Figure 2 shows a lock aside each page name, used to grant privileges.

Using our first Scenario, if our teacher, Michael, has a group or 25 students, he needs to visit interface shown in Figure 1, press "*Do not inherit privileges from course*" button, then use "*Search For An Existing User*" to visit interface shown in Figure 3 where he has to select each student and grant write privileges.

Using Scenario 2, process becomes more complex because the teacher needs to manage groups, he needs to resemble groups functionality by giving privileges to each student part of the group.

Figure 1. Current permissions interface

Figure 2. Each lock links to page's permissions interface

Figure 3. Permissions interface

3. APPLICATION DEVELOPMENT

3.1 Application Definition

The advantages provided by XoWiki are a very robust tool with the flexibility to edit content from the browser, a tool for object-oriented programming, that works in a multilingual system. These benefits were used to create the Eduwiki (Educational Wiki) application, the model to creating new applications in XOTcl Core was followed [11], creating a new package with the name: **eduwiki**, this package is an extension of XoWiki package as follows:

```
:xo::PackageMgr create ::eduwiki::Package \
   -package_key "eduwiki" -pretty_name "Educational Wiki" \
   -superclass ::xowiki::Package
```

Figure 4. Package creation using XOTcl-core API

For this application, three types of activities, to be used with most e-Tivities scenarios were defined:
- Teacher Wiki
- Group Wiki
- Student Wiki

Teacher Wiki consists of an activity, where teacher has privileges to edit an create pages in the Wiki. The activity generates an editable init page, which can be extendable. The teacher can define if the students are able to see or edit the pages of the Wiki. The main objective is that the teacher defines an activity, where all the course members interact under his direction.

Group Wiki allows the definition of activities, in which the teacher can define work teams from members of the course. The teacher can define the time period in which the members of the group can edit their activity. The teacher may define read permissions for the rest of the members of the course.

Student Wiki enables a Wiki activity for each member of the course, the teacher can define the time period in wich the student has permission to edit the Wiki, read and edit permissions for the classmates.

One important aspect to consider for this application is the permissions system and its right use. This system requires a detailed examination and verification of permissions for each of the pages created. To support this functionality, the security policy defined in ::xowiki::policy3 [12] [13] was used.

Groups management from OpenACS Frameworks was used to achieve Scenario #2 functionalities. Figure 5 shows Eduwiki Administration page, teachers can define the Wiki's activity type and groups definition.

Figure 5. Eduwiki Administration

3.2 Enabling Eduwiki tool in a .LRN course.

To enable the Eduwiki tool in a .LRN course, the respective Portlet and Applet where created using the **dotlrn-eduwiki** and **eduwiki-portlet** packages.

3.3 Class Extensions

A very interesting aspect of XOTcl framework is the class extension functionality which allows the extension and modification of the methods in the already defined XoWiki classes. This is very helpful, because some desired behavior can be added to the class without changing the original source code of the XoWiki package. Using this way reduces the risk of problems with future upgrades.

XOTcl provides two interception techniques: *Filters and Mixins* [19]. Filters acts as a means of abstractions over method invocations to implement large program structures, like design patterns while Mixin Classes as a means to give an object or a classes' instances access to several different supplemental classes, which may be changed dynamically.

One example of the use of the mixin functionality is the extension of the *::xowiki::Link* class, in its *render_not_found* method. In XoWiki when new links are created in the Wikimedia syntax: ***[[new page]],*** the original method presents empty links in the following format: [new page] (see figure 6a), while the desired functionality is the Wikipedia style: a red link means an empty page (see figure 6b).
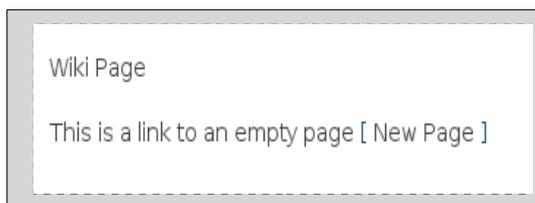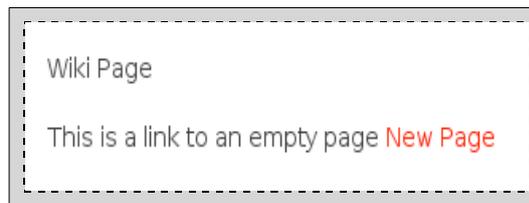

Figure 6a shows the actual style of empty pages   Figure 6b shows the desired functionality

For this functionality a mixin to *::xowiki::Link* class was created inside the *initialize* proc for XoWiki sub package Eduwiki as follows:

```
Package instproc initialize {} {
  ::xowiki::Link instmixin add ::eduwiki::EduWikiLink
  next
}
```

Figure 7. Mixin example

A new class, *::eduwiki::EduWikiLink,* was created. This class overrides *render_not_found* method to include the desired behavior.

5. CONCLUSIONS AND FUTURE WORK

A very interesting aspect of XOTcl framework is the class extension functionality (mixin), which allows the extension and modification of the methods in the already defined XoWiki classes. This is very helpful, because some desired behavior can be added to the class without changing the original source code of the XoWiki package. Using this way reduces the risk of problems with future upgrades.

A very important aspect to consider in future developments is the concurrency management. The case, where two students are editing an activity at the same time, can be easily avoided by placing an alert or message that another person is modifying the same page. A kind of "merge" of the modifications of both students, can be a solution, too.

Another aspect to consider is the integration of an evaluation system, which can be very helpful for a teacher who desires to grade a student by his own criteria or by the students collaboration in the edition of the content of the Wiki activity.

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A Twitter Application for .LRN

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Abstract

The social network has grown in such an enormously way, and it has taken part of the human life more and more. The concept behind the social networks is its ability to allow the user to have contact with their family and friends easily. Today, Twitter take parts of the most popular Social Networks, in this paper a Twitter Application has been done to provide the ability to create a channel of communication for each course that has .LRN, in the matter of supply a better education using the context and environment that people is using nowadays, this will help to increase their knowledge having more interaction with other people, sharing with other users the topic in matter that has been learned or teaching their own perception and knowledge about it.

1 Introduction

Since 2004, the powerful emergence of a new website design has been called Web 2.0, characterized primarily by the turned of Internet into a participatory space, full of collaboration tools that allow users to easily.

One of the challenges of the teacher is that the student has gone from being a passive (receiver) to one increasingly active (collaborative) who now is a creator of knowledge, so the teacher has evolved from the expert who gives master classes to the facilitator, counselor jobs, adviser who accompanies the student in their formation.

Educational Web portals, social networks, spaces exchange multimedia (slideshare, youtube, Scribe, flikr, etc.) among other tools of Web 2.0 are spreading and becoming popular among students, becoming indispensable tools for development their daily activities.

This paper presents an application that works with an experimental study on the utility potential of social networks of Web 2.0 for the training of university students. The use of these networks means radically change the traditional view of education and student's development. Faced with a definition of training as an individual action that the teacher assumes, being the source of information and knowledge.

The present study demonstrates a way to incorporate the student collaborative learning techniques using new information and communication technologies, using the microblogging [1] tool Twitter [2] to make a communication channel and that way promote cooperative learning. Twitter it is used to share what are you doing?, what are you reading?, where are you surfing? and above all, what do you believe and feel.

The Twitter application provide a simple and rapid access to resources that Twitter provides, in order to carry out our study.

2 Design and Implementation

To begin with, it is necessary know what Twitter does and what is it allow to do, with the purpose to understand what this new application is able to do. Currently Twitter provides an API [3] which contains a great variety of functions that enables switch the status on an easy way; as well to manage the counts of each user from the created application. To establish a connection with the Twitter services the application use the two HTTP [4] methods, GET and POST.

Among the methods that Twitter supports, the application it is based on the following methods: "search" and "statuses/update". These two methods with the purpose of establish communication between the created applications with Twitter.

The method "search" allows to search channels using key words that has been posted by the users such as comments or posts; using this function is obtained two different ways to acquire the returned results by Twitter, using a format "json" [5] or "atom" [6], the application uses the answer "atom" which analyzes the obtained information by messages with an specific channel. This method works with a "GET" request to Twitter.

The method "statuses/update" authorizes switch the status of users as long as them grant their user account to make possible the correspondent authentication with Twitter's server. This particular method works with the POST method and uses "Basic Auth" [7] to be correctly authenticated. Similarly, to the previous method, this one gives the chance to choose which kind of answer get: "json" or "xml" [8], where "xml" is the one that uses the application described. Subsequently, this given answer is the information of the new status as a result of entering the so called new status.

The main idea of the application itself is to include an application that allows from the very inside of the structure dotLRN [9], specifically, inside every course or community, creating a communication channel on Twitter where could be easier find the messages related to the taking class. This is accomplished, adding symbol "#" at the beginning of a word to create or write on this same channel to make possible share information about a topic according to the main topic.

The purpose of using Twitter is because is a well known tool, lately popular, in the same way it is used by anyone whether they are taking an specific course or not; therefore anyone who is knowledge about the topic in question on the channel, is empowered to participate on the learning of people which is taking the course.

To be able to create a channel for each course is necessary use unique identifiers, because it is unwanted show a different information about two courses on the same channel, that is the reason why the application uses the community_id of the course or community in matter to create the channel; thus any message with the word #{community_id} of an specific course contains the information of only a course, because this value is unique in the dotLRN's system.

Whereas Twitter is being used, there are several restrictions because of security measures; among them, one so called is not to do to many calls from one site to Twitter's server on a determined lapse of time, if the amount of calls it is exceeded, Twitter blocks the access toward them from the application, which is unwanted, however the system needs to manage the message information from different courses, and be able of give to each student the last tweets information that has been founded on the channel, for this reason the application uses cache memory to store those messages, so every time that someone enters into a course that contains this application, a call will be made only once to Twitter's server and in the very moment where the answer is received, this one is stored in cache; as a consequence when the user enters again to the course the only messages that will be shown would be cache, avoiding make a new call to the server which will return the same information.

Even though this is a good idea it is noteworthy that if the information keeps on stored on cache, it may loose lots of the recently entered information in other ways differed to the application, or Twitter's homepage, or even by some kind of information management; for this reason the application consists on holding times, to retain the messages for a while, after that it may be possible obtain the information from Twitter's server and in that way get the updated messages to watch them with the application.

3 Twitter Application

The application of twitter is responsible to integrate in an efficient manner, the dotLRN system with Twitter platform, and thereby provide users with the interaction by either means. This application displays a predetermined amount (4 by default) of lastest posts that have been written of the course into the channel Twitter.

The learning platform used for the application's development is called GES [10] (Galileo Educational System), this platform is used within an institutional framework within the University Galileo [11], for all academic programs. The platform is based on open source LMS called dotLRN.

The requirements that a user must have to make use of the application is to have at least one account in the GES platform and a Twitter account, as the first step in using the application is enter the username and password to create the connection with Twitter when the application needs send messages to Twitter, if a username or password is not entered, the user still have access to watch the last messages that have been put into the course's channel.
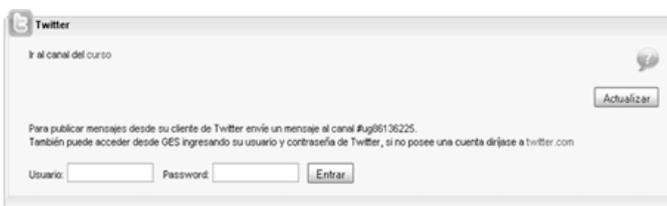
Figure 1. Twitter-GES's portlet
Before entering a username

The tool receives messages from students and synchronizes with your Twitter profile, allowing to visualize the last four posts made within the course site, and providing a link to view all.
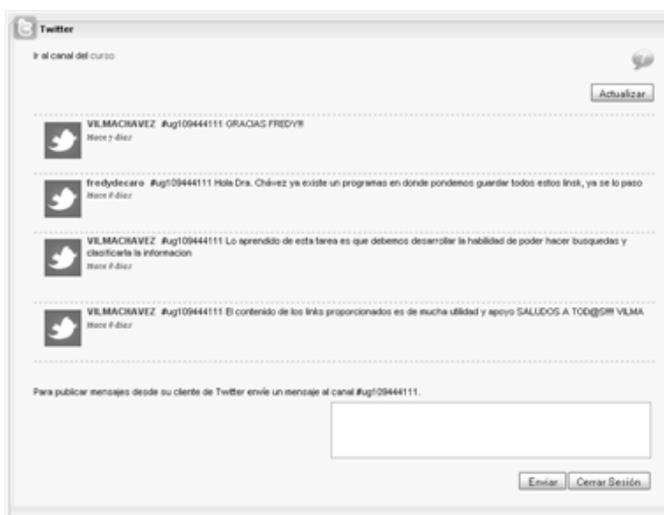
Figure 2. Twitter-GES's portlet
When showing last messages

Using this application is important because it helps to stimulate the intellectual work around the course, teamwork, relations project/course, increase the participation. Probably many students are used to this

kind of mass media, therefore this tool could be a very eager an active way to communicate. In contrast, what about the students that doesn't even know about the tool, well is an excellent chance to reduce the digital gap and prepare them to face the future challenges

4   Evaluation

At the time of having an application that facilitates the interaction of a course in a Twitter channel, is necessary to create new forms of study and teaching, to make used to the maximum this tool, which takes into account the following didactic.

4.1 Microblogging in didactic activities

To check whether the microblogging Twitter tool is effective to support learning through an educational platform, It took place an exhaustive study based on an experimental desing taking the following objectives:

a) To determine the proportion of students whom has the Twitter service.
b) To hear the views from students about the importance of Internet as an information source.
c) Determine the impact of the links provided for the topic under study.
d) Determine whether the guided research achieves better results.
e) Check whether the use of Twitter encourages collaborative learning.

4.2 DEVELOPMENT STUDY

4.2.1 Student Profile

This study had the participation of 10 students of the Master Degree in Planning and Management Policies and Programs Infant Feeding in e-Learning, taught at Univerity Galileo in Guatemala. The participants come from different programs or health institutions with a history curriculum in the area of infant feeding. All are capable of understanding English texts and internet accessibility. There are students from various countries in Latin America.

The Master Degree has a duration of 2 years, divided into 24 courses (3 per quarter) teached on the e-Learning model, it is estimated an average of 720 tutorial hours plus a further 1440 hours devoted to reading, study, discussion, reporting, testing , field work, preparation and drafting of the final research.

4.2.2 About Twitter

Twitter is a microblogging system that allows us (in no more than 140 characters) to tell our friends, family, clients or whoever decides to "follow us", what are we doing?, in other words is a log of our activities and at the same time a communication system to send messages to other users. The "tweets" (little messages sent by users of Twitter) are used to respond to the question "What are you doing? and can be sent by both the web and via SMS.

Recently some communications media made use of Twitter to make known to their readers of its latest news. Also service is becoming increasingly used in universities..

In this time, it was used as a media to promote the cooperative learning and as a tool to develop skills acknowledge web information, synthesize and classify links, just to name some of them.

4.3 Design of Educational Activity

The activity took place in the course "Management in Health Care I," for the seventh quarter of year of the Master Degree. The learning theme was "Evidence Based Medicine (EBM) and its contribution"

4.3.1 What was the didactic objective?

The objective of this activity was to develop a means of outreach to students, giving them the opportunity to share knowledge among all its peers, encouraging cooperative learning. At the same time integrate a media currently used by most Internet users in the classroom, thereby providing the participant an appropriate utility.

4.3.2 What considerations were taken into account?

Considering student's profile, described before, several different activities were considered to insurance that students could create a user on Twitter. In addition, noticing that 100% of students did not had 3G services on their cell phones, it was only exposed as a sending text messages tool Twitter – Ges without taking the different developed applications for the so called objective.

4.3.3 How the activity was released?

The activity was design joint with the teacher and was implemented by the e-moderator [12] of the course, through Twitter – GES tool.

Besides, a porlet was created, inside the portal's course where the main instructions were given such as a link for the general forum, which redirected the related doubts about the activity.

Figure 3 Informative Portlet

4.3. What did the activity was about?

The activity was divided in two phases; the first one consisted on give the general information about the tool to the participants on the course, placing the necessary information to register, add friends, and write the first messages. The first phase last four days (September third of 2009 – September sixth of 2009) to complete this phase a tutorial for the student was made.

The second phase was focused on the uses of the tool as a mass media, the activities were:

a. Check the proposed links (links related to the topics of class second week – Evidence Based Medicine (MBE) and its contributions.

b. After the revision of the proposed links, a micro-message needed to be set using Twitter - Ges application, which was enabled on the course.

c. Each micro-message should indicate the well and the wrong issues that were founded in every websites. Add references of alternate sites that could be helpful to the rest of participants and comment about the review contents.

d. As last activity of the week, each one of the participants should submit a synthesis demonstrating the reached learning. (Assignment Presentation: individual)

    a. Final Report Requirements (Synthesis)
       i. Cover
      ii. Content synthesis
           (Summary and obtained learning)
      iii. Friend recommendations

Indicate the most likely comment and the reason why

iv. Final comment of the activity

The second phase last six days (September seventh of 2009 – September thirteenth of 2009)

5 Results

5.1 Bennefits/Advantages

Twitter's experiment was successful, mainly because encourage many students to participate in different ways. Even in the smaller classes, just a few students were the ones that participate actively on class discussions.

The students knew that their participation degree on class would be determined in some part because of their participation on those debates and mostly of them seemed comfortable using technology to collaborate with the reading materials.

The participation was very motivated when mostly of the given answers matched with the acquired learning. In addition, when it was time to share the well and wrong opinions about the consulted links, a net of valid references approved by the group was being built, taking an advantage from every resource.

The proportioned links for the activity were very useful, also the collaborative work, allowed an easily understanding of the information.

The learning curve for Twitter's tool was very small, after the fist day students already manage the tool.

Some of the reasons that justified if Twitter would be an successful tool to use will be:

- Allowed the students get lots of references about the course theme.
- Provides a large number of extra material not covered in the course, but material given by the students.
- The course's channel enabled to follow up on all micro-messages.

It is absolutely essential that educators consider new approaches and technologies in the classroom.

5.2 Limitations

- 100% of students did not have an account on Twitter.

- There was rejection to use this new learning method, because prior to this study, students used the forum as a means of communication, one of the main comments was that they saw the Twitter as a kind of chat.
- Twitter is a bit limiting when trying to share information related to a class issue. The messages have to be under 140 characters, so the students can not go into detail in his comments.
- It is difficult to carry the common thread of all the interventions.
- If the activity is not well directed and constantly monitored by the professor, can be taken as an informal and without any didactic purpose. (Lost Time)

It was also a little difficult for students to respond to messages from their peers, since it is difficult to take the thread of the conversation. The tool shows only a few messages from the channel, thereby after a while tend to be eliminated and lose all information provided by the student group (the messages were apparently eliminated from the dotLRN plataform, but not from Twitter)..

6 Conclusions

On this paper it was introduced and explained how the new application works on .LRN platform, using as a helper Twitter's platform. It is expected accomplish a better learning level with the so called tool which turns to be more popular among nowadays users.

The results of a group of students from the Master Degree in Planning and Management Policies and Programs Infant Feeding in e-Learning model, taught at Universidad Galileo, Guatemala, show some of the limitations, advantages and disadvantages that this application has and their use within the area of education.

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Lecture Notes in Computer Science: Application Usage Statistics for dotLRN

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Abstract. Application Usage Stats is an application that generates useful statistics of how teachers are using dotLRN applications at Galileo University, it has three different predefined reports and a customizable report that can be saved for future use, it is really fast for the quantity of information it manages and was designed to be scalable.

1 Introduction

In Galileo we wanted to have some useful statistics about how teachers at Galileo University are using our system so we could know in which areas we needed to improve our efforts to get our teachers to use all of our applications, so we choose the most important applications and designed some formulas to get relevant results for each one of the applications.

2 Objectives

Get to know in detail how applications are been used within a course.
Get an scalable application.
Get useful reports about each application.
Create an easy to use interface to choose option for reports.

3   Application Description

First of all I'm going to define which applications are included in these reports, all of them where elected because are the most important applications in our dotLRN installation at Galileo, the applications are: Evaluation, File-Storage, Forums, UG-Syllabus, Bulk Mail, Assessment and Content.

We defined three different reports (Report A, Report B, Report C) and a customizable report based on report C, Report A uses Evaluation, File Storage, Bulk Mail and UG-Syllabus, Report B is Report A + Forums and Assessment, and Report C is Report B + Content the customizable report is based on Report C and has the quality that users are able to choose which application to count and enter formulas parameters so they can build a report according to their needs and the option to save the report for future use.

This application consists of two parts, the first part is the one used to collect data, this part consists of another two parts, one used to collect for first time data from the applications this is intended to be run only one time, the other part is the one used to refresh data, this part is intended to be scheduled to run in a determined time but it also can be run manually if desired.

The other part is the one used to create reports, it consists of a user interface in which the user can choose to generate reports for any faculty, department, year and choose which one of the report types to use.

4   Objective Group

This application was created at first to let us know (platform maintainers and eLearning Area), how deep where teachers at Galileo University using the most important tools that our dotlrn installation is offering them, so eLearning Area could design some workshops to increase use of the less used applications.

Even though this application may be used in the future to show Galileo University Directors the usage each teacher is making of the platform but in this first phase of the application we made it just for our internal use.

5 Measured Applications

As I explained early in this paper we chose Evaluation, File-Storage, Forums, Syllabus, Bulk Mail, Assessment and Content as measured applications because those are the most used applications in our dotlrn installation, now I'll explain each one of this applications.

5.1 Evaluation:

For this application we count how many grades where created by the teacher in each class, and we count how many evaluations where created for each grade, and how many answers where uploaded for each evaluation.

The displayed results for evaluation are Online Evaluations, Offline Evaluations, Total Evaluations, Total Answers, Total Online Graded Evaluations, Total Online Evaluations Mean, Total Offline Graded Evaluations, Total Offline Evaluations Mean.

5.2 File-Storage:

For this application we count how many folders where created by teachers in each class, and how many files where uploaded.

The displayed results for file-storage are Folder Quantity, Files Quantity.

5.3 Forums:

For this application we count how many forums where created and how many messages where posted in the forums and how many replies where created for each message.

The displayed results for Forums are Forum Quantity, Messages Quantity and Answers (Replies) Quantity

5.4 UG-Syllabus:

This was simple we only counted which classes had their syllabus and if those syllabus where created using the tool or just uploaded.

The displayed results for UG-Syllabus are Total Online Syllabus and Total Uploaded Syllabus, note that normally each class will only have one syllabus and this syllabus should be either online or uploaded.

5.5 Bulk-Mail:

For this application we counted how many bulk-mail's where sent by the teachers in each class.

5.6 Assessment:

For this applications we counted how many assessments where created using the tool in each class and how many sessions where created to answer assessments.

The displayed results for Assessment are Assessment Quantity and Total Sessions.

5.7 Content:

For this application we counted how many pages of content has each class and the displayed results are the same.

6   General Formulas

This application was created at first to let us know (platform maintainers and eLearning Area), how deep where teachers at Galileo University using the most important tools that our dotlrn installation is offering them, so eLearning Area could design some workshops to increase use of the less used applications.

Even though this application may be used in the future to show Galileo University Directors the usage each teach is making of the platform but in this first phase of the application we made it just for our internal use.

6.1 Report A:

For this application we count how many grades where created by the teacher in each class, and we count how many evaluations where created for each grade, and how many answers where uploaded for each evaluation.

6.2 Report B:

For this application we count how many folders where created by teachers in each class, and how many files where uploaded.

6.3 Report C:

For this application we count how many forums where created and how many messages where posted in the forums and how many replies where created for each message.

7 Data Obtention

This application was created at first to let us know (platform maintainers and eLearning Area), how deep where teachers at Galileo University using the most important tools that our dotlrn installation is offering them, so eLearning Area could design some workshops to increase use of the less used applications.

Even though this application may be used in the future to show Galileo University Directors the usage each teach is making of the platform but in this first phase of the application we made it just for our internal use.

New Question Types in Assessment for .LRN

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Abstract

Assessment is one of the key packages in .LRN and Hot-Potatoes is well known as a teaching software, creating interactive quizzes, that is why it has been taken as an guide on how to extend assessment functionality, the interfaces are designed exactly the same way as well as the functionality and other details.

The extended version of assessment will include new question types: cloze test, match test and mix test. Cloze is an test consisting in a portion of text with certain words removed, Match is an test consisting in a set of options that need to be paired with a set of answers, the answers are displayed jumbled, Mix is a test consisting in a sentence divided in phrases, all the phrases are displayed jumbled to put it together in the right order. There is also a new interface to import documents from Hot-Potatoes.

The new question types have been completely integrated with the assessment structure, everything has been defined following the data model and code guidelines to avoid interfering with the existing features.

1 Hot Potatoes

The Hot Potatoes software suite includes five applications that can create exercises for the World Wide Web. The applications are JCloze, JCross, JMatch, JMix and JQuiz. There is also a sixth application called The Masher, that will compile all the Hot Potatoes exercises into one unit. Hot Potatoes is not freeware, but it is free of charge for publicly funded, non-profit, educational users who make their pages available on the web. Other users must pay for a licence.
Hot Potatoes was created by the Research and Development team at the University of Victoria Humanities Computing and Media Centre. Commercial aspects of the software are handled by Half-Baked Software Inc.

2 Extending Assessment's Data Model

Assessment's data model as many other packages in dotlrn use the Content Repository.

2.1 Questions Basic Information

In assessment for every question type there is a group of tables where the information is stored, this tables may vary depending on the information needed for the question type, most of the tables in the new data models need to be integrated with the content repository.

3   Extending Assessment's Functionalities

With the data model ready there needs to be a set of functionalities that need to be implemented around that data model to be able to manage the information, there is an already defined way to add this information when creating a new question type, there are a lot of standard procs implemented for all the question type and those are called the same way just using the question type key to locate the proc.

3.1   Question Type Procs

For every question type there are procs that need to be implemented in order to integrate the question type structure completely with the assessment interfaces.

The procs include the following actions:

- New: Create a new item and a first revision with the question data
- Edit: Add a new revision with the edited data to the existing item
- Copy: Copy a question
- Render: Prepare the information needed to display a question
- Process: Process and save the information from a user's response to the question
- Data: Get the basic information of the question
- Results: Get the information from a user's response and the results
- Add to Assessment: Create the question and save all the information, set the display information for the question

3.2   Display Procs

For every question type there are procs that manage the display types, more than one display type can be defined for a question type, every display types must have its own procs, the information used about the question is the same it just defines the way of displaying that information. The information that is stored for the display type depends on the needs of the question type, basic information stored is html style settings for the fields, display orientation, sort order and optional labels.

The procs defined for the display type are:

- New: Create a new item and a first revision with the display data
- Edit: Add a new revision with the edited data to the existing item
- Copy: Copy the question type data into a new question
- Render: Prepare the information about the display type and add the information to the form that will display the question
- Data: Get the basic information of the display type
- Set Display Type: Set the display type for the question type, at the time of creating the question or when editing it

4   New question types integration

The idea for the new question types is from Hot-Potatoes, the interfaces, the functionalities and everything else was designed exactly the same.

The first thing needed is the data model, once the tables for each question type are ready, some tables need to be prepared to use the content repository to be able to handle the information the same way as the rest of the question types in assessment.

4.1 Cloze

Cloze is an exercise, test, or assessment consisting of a portion of text with certain words removed (cloze text), where the participant is asked to replace the missing words. Cloze tests require the ability to understand context and vocabulary in order to identify the correct words or type of words that belong in the deleted passages of a text.

This test supports alternative words for every cloze text, this means that there might be more than one correct answer, there is also a clue, it can be defined for every cloze text and it will be displayed next to the cloze text in a tooltip box.

4.1.1 Interfaces

To create cloze tests there needs to be an interactive interface where the user can interact with the text, select portions of it and set that text as the cloze text, for every cloze text there are a set of fields for additional options, as many alternative answers as the user wants and a clue.

The interface for creating cloze text was implemented by creating a plugin for the richtext editor "Xinha", the editor was completely configured for the specific use needed for the cloze test, there are no options available for the user other than the "create gap" plugin used to select cloze text, the rest of the editor's default options are disabled.

When selecting a text to create a gap, the text becomes a link, it is an Anchor tag with a specific syntax for the ID and CLASS attributes to be able to manipulate the information later for display purposes, the content must have at least one gap to be able to submit the form.

There was a potential problem when using this richtext editor even with the options disabled, when something is pasted to the editor it might be in a richtext format, this can include HTML tags, and since this test is plain text that might cause problems, the plugin includes a check when using it that checks for HTML tags in the content, the only valid tags are the special Anchors, Paragraphs and Break Lines, the rest of the tags are removed, if the form is submitted after a paste without using the plugin, the submit section in the form does the same check and removes the extra HTML tags as well.
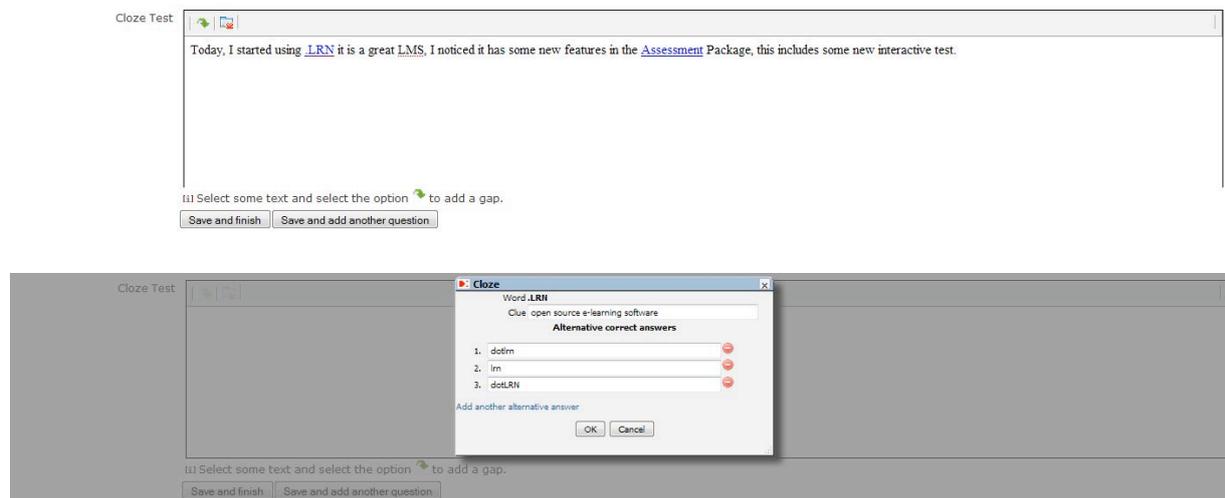
4.1.2 Rendering

When the test has been created all the gaps are Anchor tags with a CLASS attribute, those tags are replaced with text inputs with the length of the missing text, if the text has a clue there is also a box that displays the tooltip.


As this question type has more dynamic information, the standard display procs for assessment did not work, the display procs always add the fields to the ad_form but in this case the elements are in the form but not defined in ad_form, this will only cause that the elements must be read directly in the form using ns_queryget since the fields will not be set as variables in the submit section.

4.1.3 Processing

When a student takes the test, all the fields of the test are taken from an array and compared with the correct answers or the alternative answers, this process is done when the form is submitted and it grades the question automatically.

4.1.4 Results

The results are displayed with feedback about the correct and incorrect words, those results can be compared directly with the reference answer to make sure the results are correct.
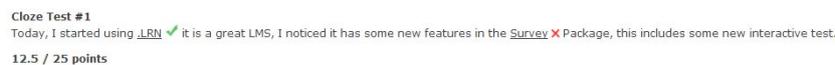
4.2 Match

The matching test is an exercise where there is a set of items on one side that have a specific match with another item on the opposite side, the participant needs to pair the items on one side with the matching item on the other side.

4.2.1 Interfaces

The match test can have as many pairs of items as needed, then the interface needs to be interactive to allow the user to add more pairs dynamically, every pair must be complete, there cannot be a pair with only one element, the form will not allow it.

There is an option "Fix" for every pair of items, this will display that pair of items solved when displaying it, this is commonly used as an example of how the test works or simply to help the participant.

Every pair of items can be removed individually, unless there is only two pairs available, the complete question cannot have less than two pair of items.

4.2.2 Rendering

When the test has been created all the pairs of items are displayed, the left items are displayed in the exact same order as they were created, the items on the right side on the other hand are displayed jumbled, this is where the user needs to start matching the items.

For this match test there are two display formats, each format has a different way for the user to interact with the rest.

4.2.2.1 Standard Format

The standard format displays the items on the right side in select objects, every select has all the options available on the right side, including a default option that is the same as not answering that match item, every select needs to be set with the correct option for the left item.

4.2.2.2 Drag & Drop Format

The drag & drop format displays the items on the right side as objects that can be dragged, every left item has a drop area where the right item can be dropped to match the items, this is a very dynamic way of interacting with the items, if an item is dropped on top of another, the old item on that area will go back to its initial spot on the right side.

Match Test #1

World's most popular search engine	→	Google
Microsoft's new search engine	→	
Google's most recent communication and collaboration tool	→	Wave
Powerful and scalable framework to support learning environments	→	.LRN
Free social networking and micro-blogging service that enables its users to send and read messages	→	Twitter Bing

4.2.3 Processing

When a student takes the test, all the fields of the test are taken from two arrays with the information from the left and right items and every left item is compared with the correct answer on the right side, this process is done when the form is submitted and it grades the question automatically.

4.2.4 Results

The results are displayed with feedback about the correct and incorrect matches, those results can be compared directly with the reference answer to make sure the results are correct.

Match Test #1

| World's most popular search engine | → | Google ✔ |
Microsoft's new search engine	→	Wave ✘
Google's most recent communication and collaboration tool	→	Bing ✘
Powerful and scalable framework to support learning environments	→	.LRN ✔
Free social networking and micro-blogging service that enables its users to send and read messages	→	Twitter ✔

15 / 25 points

4.3 Mix Test

The mix test is an excersice where there is a sentence divided into words or portions of text and the participant has to put all the pieces together in the right order to recreate the original sentence.

4.3.1 Interfaces

The interface for creating mix tests is not complex, it just needs a textarea where the sentence is divided into words or portions of text separated by the new line, there is no limit as for how many words can a line have, the textarea can have as many lines as necessary, there is no limit.

When creating the test there cannot be two pieces with the exact same words, this is because that might be confusing for the using thinking that is exactly the same but internally the identifiers are not the same.
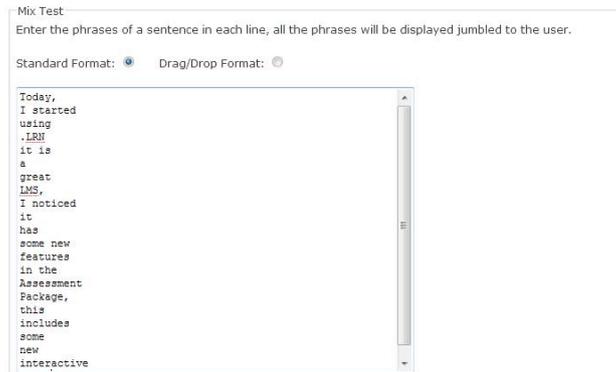
4.3.2 Rendering

When the test has been created all the portions of text are displayed in random order in a container, there is also another container that will have the correct sentence as you start to move pieces of text to it.

4.3.2.1 Standard Format

The standard format displays all the pieces of text in a container, every piece of text is highlighted every time the mouse is over it, when there is a click on that piece it is transfered to the correct sentence container, it goes to the end of the current correct sentence, in the correct sentence container the pieces have the opposite effect, if one is clicked it is removed from that container and is sent back to its initial spot.

4.3.2.2 Drag & Drop Format

The drag & drop format displays all the pieces of text in a container in small boxes, every box is draggable to the correct sentence container in any position, there are initially three lines where the words can be dropped and it dynamically can have more lines when needed, if the words are dropped anywhere out of the correct sentence container those are sent back to its initial spot.

4.3.3 Processing

When a student takes the test, all the fields of the test are taken from an array and all the pieces of text are compared with the correct order of the sentence, this process is done when the form is submitted and it grades the question automatically.

4.3.4 Results

The results are displayed with feedback about the correct and incorrect pieces of text, those results can be compared directly with the reference answer to make sure the results are correct.

Mix Test #1

Today, ✔ I started ✔ using ✔ .LRN ✔ it is ✔ a ✔ great ✔ LMS, ✔ I noticed ✔ it ✔ has ✔ some ✔ new ✔ features ✔ in the ✔ Assessment ✔ Package, ✔ some new ✘ interactive ✘ this ✘ includes ✘ test. ✔

19.32 / 25 points

5 Conclusions and Future Work

The Assessment package is one of the key tools in .LRN, there is a lot of work that can be done around it to make it a stable and powerful tool for teachers to use in the learning process. The main idea for this project has been completed but the needs are constantly changing and is always possible to keep improving this package in any way as needed.

Integrating OpenACS/dotLRN with an Open and Accessible Service Architecture Framework

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Abstract. The paper describes the integration of the dotLRN learning management system (LMS) with the Open and Accessible Service Architecture (O-ASA) framework in the scope of the EU4ALL project to provide services for accessible and adaptive lifelong learning. Enabling interoperability between the LMS and the O-ASA framework allows for adapted services such as content personalization and recommendations support. Following an introduction on the O-ASA framework, the architecture design of the integration with OpenACS/dotLRN and the standard-based technologies used for its implementation are presented. Finally, the paper presents ongoing work for a wider integration with the framework.

Keywords: Learning Management System, dotLRN, OpenACS, Accessibility, Adaptation, Personalization, Recommendations, Interoperability, Standards, Web Services.

1 Introduction

EU4ALL is an European Commission funded project (6th Framework Program)[1] that aims at providing services for Life Long Learning especially designed to offer sufficient support for disabled people. To do so, EU4ALL uses three key strategies [1]:

- That the technology that mediates lifelong learning does so accommodating the diversity of ways people interact with technology and the content and services it delivers.
- That this technology is used to bring support services to disabled learners.
- Providing support services and technical infrastructure that enable teaching, technical and administrative staff of educational institutions to offer their teaching and services in a way that is accessible to disabled learners.

An Open and Accessible Service Architecture (O-ASA) for ALL (Accessible Lifelong Learning) has been designed and implemented by integrating it with two different LMS, Moodle and dotLRN . The results will be validated in two large scale pilots at two distance learning universities, UNED and Open University (UK).

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1 EU4ALL (FP6-2005-IST-5): https://adenu.ia.uned.es/web/en/projects/eu4all

To offer adapted and personalized services and content, the system needs to know the user model in terms of needs and preferences. Two main components are provided in EU4ALL to offer personalized and accessible services taking as input the information managed by the user model server. On the one hand, the content personalization service, developed by Indra, provides a pointer to the content that best matches the user needs based on her profile and the metadata description of the content. On the other hand, at UNED we have developed a Recommender System to enrich the LMS with adaptive navigation support.

The aDeNu group is also coordinating the A2UN@ project[2]. This project objective is to develop a general standards and user modeling based framework to support LLL (Life Long Learning) services, attending accessibility and adaptation needs for ALL in Higher Education. The research is focused on re-usable adaptive learning flows to enhance learning performance and provide psychological support. A SOA based architecture will support the interoperability and integration of the services of the framework.

Adaptation to the evolving needs of the context has also been addressed by the aDeNu group in a previous project ADAPTAPlan[3] [2]. A planner has been implemented to generate learning designs adapted to the user's competencies and learning styles. The work carried out in ADAPTAPlan to model the user's competencies and learning styles and provide recommendations to guide the user is being reused and extended in the EU4ALL and A2UN@ projects.

2 Standard-based, Open and Accessible Service Architecture

The Open and Accessible Services Architecture (O-ASA) has been designed using SOA principles and available standards to guarantee its openness and interoperability allowing third-party components integration and the deployment of accessible services.

The framework interfaces are implemented using web services, W3C SOAP and REST based, for the exchange of information between the framework components and between the framework and the LMS that uses it.

In the following subsections, we present the components of the O-ASA that have been integrated with the dotLRN LMS, the standards used for each of them and how they interact to provide services for ALL (Accessible Lifelong Learning).
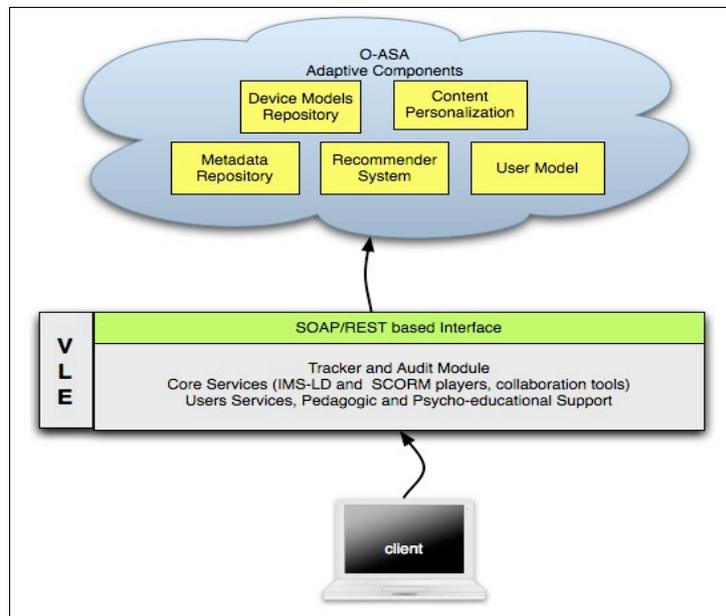
Fig.1 Overview of the Open and Accessible Service Architecture

These components (whose details are provided below) support the end-user services required, such as the pedagogic and psycho-educational support through standardize instructional design (IMS-LD and SCORM), assessment, collaboration tools and enterprise services.

2.1 User Model

The User Model (UM) has been developed at aDeNu group following an iterative process. The first version produced at aDeNu supported IMS Learner Information Package (LIP) and IMS Accessibility for LIP, and is described here [3]. However, the current version has evolved. It now integrates IMS-Learner Information Package specification for educational information and ISO Personal Needs and Preferences for the accessibility one.

On the one hand, regarding the IMS-LIP specification, the following information is managed:
- demographics
- general preferences (e.g.: language)
- learning styles: in terms of Felder dimensions (perception, input, processing, understanding) computed with the Learning Styles Inventory test [4]
- competences: indicators regarding user skills (experience, goals, ...), both regarding the learning contents and the interactions (e.g. collaboration, communication, participation, initiative, ...)

- progress: indicators regarding user progress in a course (knowledge, achievement)
- psychological profile: indicators about attention, memory, time management and others

On the other hand, the ISO/IEC 24751-2 standard, "Access for all" Personal Needs and Preferences for digital delivery (PNP), is used for user preferences regarding accessibility of web content and the assistive technologies (screen-reader, braille line, voice recognition, etc.) the user may be using to access it.

2.2 Device Model

The Device Model (DM) has been developed by the Fraunhofer Institute for Applied Information Technology (FIT) and its function is twofold. It provides identification and description of the capabilities of user agents. This information is stored using the User Agent Profile User Agent Profile (UAProf) vocabulary and device description framework implemented by the Open Mobile Alliance (OMA) based on W3C's CC/PP6 standard. On the other hand, it provides for collecting static and dynamic properties of mobile and wireless devices using the Wireless Universal Resource FiLe Open source initiative (WURFL) and exchanging them between the client and the service provider.

The DM component detects the presence and changes of:
- installed software and media support: OS, plugins, media codecs
- active assistive technology processes: screen reader, magnifier
- attached hardware: Braille line
- system settings: volume, display geometry
- system resources: memory, CPU usage, network bandwidth

This information is inserted in the HTTP negotiation for its propagation to other components of the framework to provide an adapted response for the user's requests.

2.3 Tracker and Audit Module

The Tracker and Audit Module (TAM) has been implemented at aDeNu as a dotLRN package as is specified in [5]. It provides useful information to the user model related to the interactions on any of the dotLRN modules. Everything can be tracked, both active actions (based on creation of objects) and passive actions (based on visits to objects) done by the users. However, in order to be efficient, the administrator can properly configure the TAM to focus on those elements that are relevant to be analyzed. Moreover, the TAM provides its own scripting mechanism that is used to configure the information to be gathered.

2.4 Recommender System

The Recommender System (RS) has been developed at aDeNu to extend the capabilities of LMS to offer adaptive navigation support. The RS uses the information from the users' interactions (both LMS database and TAM's) and the user model stored in the UMS to generate recommendations that meet the specific user needs. A formal model has been defined to create the recommendations at design time in terms of applicability conditions and restrictions, which are later used for selecting the appropriate recommendations for the user in the context at hand [6].

2.5 Metadata Repository

The Metadata Repository (MR) has been developed by ATOS and stores and manages the description of resources used by the LMS. The resources can be stored in the LMS or any external content repository. The MR uses the ISO/IEC-24751 standard, "Access for all" Digital Resource Description (DRD), to represent this information.

The standard allows to describe two categories of resources: 1) the original, as it was first authored, 2) alternatives that represent the same information but using a different form. For example, an original resource may be a video and one of its alternative a video with audio description, another alternative could be the same video with captions added.

Tagging resources using ISO-DRD provides the framework with a way to select the most suitable content according to the user needs who requested it.

2.6 Content Personalization

The Content Personalization (CP) has been developed by INDRA and is in charge of providing pointers to alternative resources that better suit the user needs and preferences. To make decisions on the best alternative for the user, the CP needs to retrieve the metadata that describes the requested resource as well as the metadata of the alternative resources if there are any, the user preferences for content and the capabilities of the device currently used. Rules are applied to find the best match and the result is returned to the consumer of the service. If no match could be found then the original resource will be used.

3   Integration with dotLRN

All the works presented in this section have been carried out by the aDeNu research group and cover twofold objectives: first, to extend the accessibility of dotLRN, second, to integrate the external services from the O-ASA.

To provide accessible content and services, the first step has been to improve the accessibility of the dotLRN LMS by applying the Web Content Accessibility

Guidelines (WCAG) of priority one and two in order to reach level double-A. This work started in the version 2.3 of dotLRN as part of the works in the ALPE[4] project [7] in conjunction with the OpenACS community [8], and has been completed in version 2.4. However, since the LMS and technologies used in it evolve with time, accessibility is assessed and improved for each new version of the LMS.

Furthermore, dotLRN has been integrated with the O-ASA framework. In the following subsections, the integration with each of the components is described.

3.1 User Modeling

To gather the user preferences and needs for content accessibility, a form has been implemented in the user control panel of dotLRN. Using the form, the user can specify which alternative best fits her needs for each type of media (see Fig.2)

Fig.2 Form for content accessibility preferences in dotLRN

When the form is submitted, the data is sent to the User Model component of the O-ASA using the web service interface. The preferences for content accessibility can be edited and modified at any time, they will be updated in the User Model.

The learning styles are gathered using the Felder questionnaire. A form has been implemented and deployed at the user control panel of dotLRN. After submission, the user will be presented with the results of the questionnaire and the data will be sent to the User Model for its storage (see fig.3).

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4 ALPE (eTEN-029328): https://adenu.ia.uned.es/web/en/projects/alpe

Fig.3 Index of Learning Styles Form in dotLRN

The user model can be used also from the Grail player, included in the IMS-LD package of dotLRN, [8] to store and retrieve personal global properties of the learning design. The personal global properties are identified by a URI that in turn is resolved by a client in the LMS side to request the provider of the property value. To be resolved properly, the URI must contain the provider and the property identifiers. Optionally the property identifier can include its path in the provider repository. In the case of the User Model of the O-ASA, the URI of the property has the following format: provider/property_type/property_name, where the type of property can be one of "goal", "interest", "competency", "preference".


Fig.4 Service Contract declaration for the UM-IMSLD integration

For the integration, a service contract has been added from the IMS-LD package (see Fig.4). This contract declares two operations to get and set personal global properties. The user model client plugin implemented for dotLRN provides an implementation

for each of these operations. The client requests the User Model using its web service interface to store and/or retrieve the value of the property.

3.2 Offering Recommendations

The Recommender System (RS) is used from dotLRN to provide the user with recommendations to improve her experience while navigating in the LMS. The RS service is invoked at runtime to retrieve the available recommendations according to the current context (user model, interaction, device and site location). The recommendations are received as a list of URLs and associated text that is parsed by RS client implemented in dotLRN and displayed to the user in her portal (fig.5). Details on the integration in dotLRN are provided here [10].
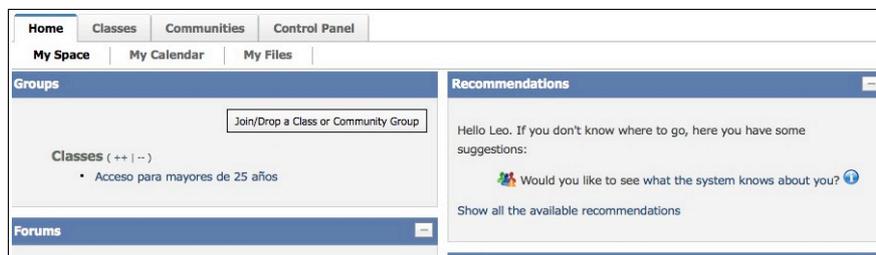
Fig.5 Recommendations as presented in the dotLRN user portal

3.3 Personalizing Content

The Content Personalization module of the O-ASA has been integrated in dotLRN implementing a client package that can be used by any package that serves content from the internal content repository or any external ones if those resources have been previously tagged in the Metadata Repository (fig.6).

When the user requests for content to dotLRN, the content resolution is passed to the CP client that in turn requests the CP to ask for an alternative for each media referenced in the document. If an alternative exists, two cases may occur: 1) the alternative resides in the local content repository, 2) it is an external resources. In case one, the alternative is retrieved from the content repository and served to the user agent. In case two, the reference to the original resource is replaced with the alternative one in the document.
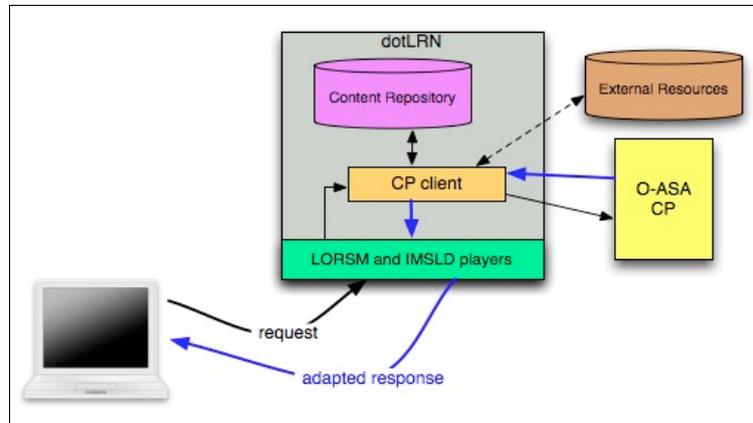
Fig.6 Content Personalization integration architecture in dotLRN

4 Conclusion and future work

In this article, we have described how dotLRN can be extended and enhanced by integrating it with external frameworks such as the O-ASA one introduced in the EU4ALL project. These works are in line with the UNED commitment to use dotLRN [11]. Such integration improves the user experience when using a LMS by providing accessible and adapted services. Future and ongoing works at aDeNu include the implementation of a user interface in dotLRN to compute the psycho-educational type of support a user needs, to be stored as a user property in the UM that in turn can be used in Learning Design to adapt the learning path.

Regarding content personalization, we are currently working on providing an interface to tag the resources stored in the LMS [12]. The metadata will be stored in the MR to be used by the CP. Also the properties of the device provided by the DM will be used in dotLRN to adapt the documents layout and media content to the device capabilities.

Acknowledgments

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