How we can mark the rhythm of the daily work by using a Learning Management System as Moodle?

ÁNGEL
MORA BONILLA
University of Málaga
Department of Applied Mathematics
E.T.S. Ingeniería Informática
SPAIN
amora@ctima.uma.es

MARÍA DEL PILAR
SARMIENTO MORENO
Graduate on Economics Sciences
Schoolteacher on Formation and
Labor Orientation
SPAIN
alariette@yahoo.es

ENRIQUE
MÉRIDA CASERMEIRO
University of Málaga
Department of Applied Mathematics
E.T.S. Ingeniería Informática
SPAIN
merida@ctima.uma.es

Abstract: In this paper is shown how e-learning can help us to mark the pace of the daily work of on-site students when they are studying alone. In the classroom, it is an easy task to orientate the work of the pupils by classical methods, but these ones have the lack of be inadequates to regulate the student's work when they are out of the classroom. E-learning can help us, and so, here is shown how the use of some tools provided by an LMS (Learning Management System) such as Moodle allow teachers to schedule activities in order to students face up to appropriate learning environment when they are studying alone. Moreover, these e-learning tools permit collaborative learning as a way of reinforcing their activity and solving problems in real time. We have focussed our attention to those tools of Moodle that let us direct our efforts toward the achievement of this goal for in site students making their daily work in their own time autonomously, and how the use of techniques, activities and resources of e-learning can help them in real time. Moreover, schoolteachers always have an updated information of all activities carried out by students. It allows teachers to become aware of those aspects of the learning process or topics that students find some difficulties and make the appropriate corrections in real time, in other words, it enables the early detection of those obstacles that can produce unsuccessful results.

Key–Words: Learning strategies, collaborative learning Moodle, LMS, e-learning, guidance, blended learning.

1 Introduction

With the increasing popularity and widespread use of computers and INTERNET as a communication and data transmission vehicle, computer-assisted learning has become one of the most dynamic research fields. So, different countries educational systems have incorporated that social phenomenon to improve the learning at all levels, compulsory and non-compulsory (primary, secondary, university, etc.). Regarding secondary education the "Junta de Andalucía" has been providing the schools with Information and Communication Technology (ICT) resources so that there is a change in the teaching methodology by including ICT in the daily teaching-learning process. On regards of higher education, the University of Málaga has provided all professors with the platform Moodle and a learning support center where the platform is managed and professors obtain information and support. Both institutions promote the research about e-learning, where the mainstream is the integration of online education into regular classes in order to increase learning effectiveness maintaining quality. Moreover, some subjects can be running by any of both methods: on site and distance courses.

Nowadays the importance of e-learning is evident, we just have to search on Google about 'e-learning' or 'b-learning'. More than 1000 millions of entries will be provided being most of them related to institutions promoting distance courses. Many others are either handbooks about software tools describing their characteristics, or papers describing experiences and activities about e-learning with limited or without on site attendance (only tutorials), (see [28] for an interesting use of video-conference). However, there are only a few that are related to the incorporation of e-learning techniques to better ordinary on site courses ([20]).

In recent years the development of learning programs has gradually evolved from local environments to on-line based applications. So, since the first learning programs written in standard programming languages as Basic, Pascal, Logo or C, it evolved to XML applications made with Dreamweaver, Frontpage, Flash and others. But, it requires much resources on design, time and programming skills. To avoid these difficulties have appeared the deployment

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of course or Learning Management Systems (LMS) gaining quickly worldwide popularity. One of the most widely used is Moodle ([9]).

In this present paper we have applied our previous experience, in some courses focused on both university and secondary educational levels because we think e-learning can be very profitable to establish the rhythm of daily-work for standard students. It can be very useful for those students who cannot be present in their lessons, such as students with specific illnesses or those who are retaking a year.

Due to all this, we make use of the e-learning to improve the aspect of guidance of the daily work autonomously at home. Furthermore, before the existence of INTERNET, students could only consult their parents, older brothers or sisters, other classmates, etc. to be able to solve their doubts when they were not at school. Nowadays, the existence of forums, e-mails, chats, wikis, and so on, are also possible, being of a great help.

When a teacher wants incorporate e-learning to their lessons, they must think about the students' home as the learning environment where their students reinforce the topics worked in class. In ([25]) is stated as most people consider that they learn best:

- At their own pace, at times and places of their own choosing.

- Most times they prefer learn with other people around, especially fellow-learners.

- When they feel in control of their learning.

So, most learning happens independently, but this does not degrade the role of professors since they must help learning by providing learners with material, testing their learning and giving motivation and feedback. Providing students with the appropriate instruments to make that learning easier and more productive in that context. For example, encouraging cooperative work among students as in forums or solving quizzes in groups.

Figure 1 shows a standard learning process:

- Firstly, a student must be provided with enough 'motivation', generally it is external to the learning process: obtain a degree, improve her/his labour prospects, etc, it produces a wish of learn.

- Secondly, professors must put him/her in the adequate learning situations by providing enough materials an suggesting activities for doing. We expect they 'learn by doing' those activities in groups or alone.

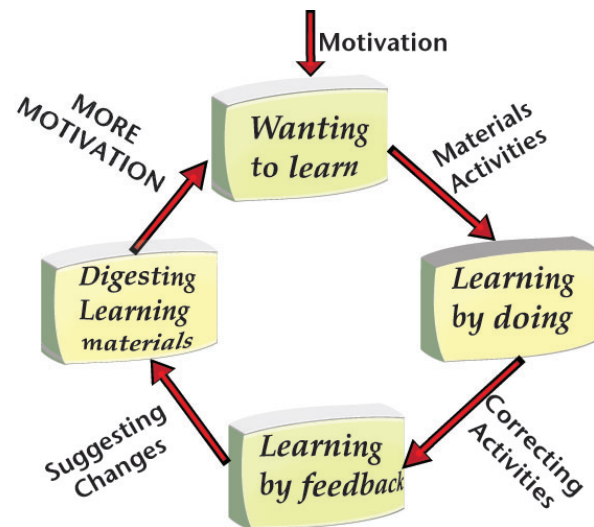 Since we think the student's activity is the only way to learn, we have placed a motivated student

Figure 1: Learning process.

in the learning situation where we think (s)he is going to learn.

- Now, students need some feedback, it can be obtained by correcting those activities well automatically (computer designed activities) or by the professor. This feedback produces a new learning step where they learn from errors.

- The professor must 'suggest changes', by giving clues for solving, or improving solutions. In this step the student must consolidate the learnt topics by integrating them with others. Is interesting give examples and real applications where (s)he can apply them.

- In this moment, a learning cycle has been achieved, professor must give 'new motivation' to initiate a new one. It can be easy if the previous learning process has not been bored.

The teacher must consider some things related to e-learning: (see [15], [17], [18], [21], [26], [25])

- The guideline of students by e-learning is a lot of work, much more than the classical in site lessons. But, it has the advantage of being able to be reused, with changes, for later uses.

  It is a proven fact that, materials prepared for in site students usually does not work when they are placed into the net for e-learning. It is quick, economic and easy, but it does not work. It produces a high level of dropouts since usually this method is bored (see [15]). E-learning materials require much more design and experience in order to understand the learning situation where

the student is at each moment and give tools and motivation to solve possible problems. Since e-learning courses only are cheaper than classical ones for a large group of students (see a comparative of costs in [18]) and professors must anticipate multiples situations although they never take place, the fan of possibilities is large and the work of preparation of materials is high.

Another related problem is that this new materials must be performed on the free time of professors. So, only those professors with many students or that repeatedly give classes of the same subject could be interested on create new specific material and the temptation of reusing old one oriented for in site students is very high.

- Students need regular feedback on their progress and they need to be motivated by activities with a prefixed deadline. We can assess that motivation is the most important item on teaching. Unfortunately, it is difficult know how students can be motivated to study certain subject since most of what they need to learn in educational environments are not motivating for themselves. Motivate is achieve that a student will be interested in learning some aspect of the subject, the complicated is how we cause it, additionally in virtual environments.

  Possibly, motivation is the most difficult educational aspect to achieve online, but when it is obtained, students perform activities by themself, and this is necessary since student activity is the most important item on learning (see [23, 24] for a study about the learning process and knowledge's types).

  A good method, when it is possible, of obtaining motivation is giving a quickly feedback. By designing self-corrected exercises (see for example [16]), the learning process acts as a laboratory where the students learn by an essay-error method.

- Although there exist many tools for online learning, only a few good ones are necessary. Moodle, or any other LMS, supplies enough tools to promote activities. A good learning course does not have to use all of them, a course is not better when uses more different tools, it is better when it uses the most suitable for every aspect of learning. Moreover, understand each new tool requires an extra work, that is not directly focused toward the main objective. For example, when we are teaching mathematics, the first time that we promote the use of a task of Moodle to solve

a problem, the student must solve it, put the solution into a file and learn how to send the file to the professor and made it adequately. If we use much different types of activities, most of the student's work is doing in understanding each new tools, not in solving the problem.

- In order the e-learning course to be successful, the teacher must receive much feedback about those aspects that do and do not work. The teacher must collaborate and share ideas about previous work and work to do. This feedback helps to drive the course, so, due to the received information we can change the scheduled activities, by designing new activities or removing others.

  This feedback helps the teacher to become a better professional by designing and choosing suitable strategies in the teaching-learning process.

In order to obtain a cooperative learning environment at the students' home, teachers have many tools at their disposal (see [22]), among those we can select:

- **CMS (Content Management System):** This type of programs simplifies the creation and administration of contents by separating that creation from its presentation. A CMS allows the link of material (graphics, text, ...) from different formats, giving a unified material. This type of programs make the unification of contents from several teachers, easier. The main users of CMS are publishers, but teachers can obtain many benefit from them. A CMS is the most suitable tool to prepare material which is going to be developed by several teachers. The most extended ones are Mambo ([8]), Joomla! ([6]) and Xoops ([13]).

- **Learning Management System (LMS):** They also are known as Virtual Campus or Learning Platform, it consists on programs that allow to automate many types of administrative actions: registers courses and users, control of users data and carries out reports, controlling participation, evaluating students and, the most important aspect for us, they provide many tools for the interaction professor-student, professor-professor and student-student (mail, forum, chat, video-conference, ...).

- **Learning Content Management Systems (LCMS):** It is a mixture of previous two. They are focused on professors and teachers. Usually they use the XML language and several standards such as AICC, SCORM for creating and

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exporting contents. A good example of LCMS is Atutor ([1]) that is easy to use.

Among them, the most widely used platform is, by far, Moodle (Modular Object-Oriented Dynamic Learning Environment). It can be considered a free LMS but having some characteristics of LCMS. Moreover, there exists several CMS (Joomla, Ekasi, Mamboo and Xoops) integrated with Moodle [6, 9, 10], so it has been selected by many universities (Málaga among them) and the "Junta de Andalucía" to give support to the Virtual Campus.

In this paper our attention will be focused on Moodle, although it can be easily directed to any other platform due to most them offer similar activities.

We must point out here that free LMS are, in general, more complete than commercial ones, existing some others good free platforms (Dokeos ([4]), Claroline ([3]),...), but the use of Moodle is much more generalized (see [14, 18]).

2 Selecting Moodle

Moodle presents some interesting characteristics for the main objective of guidance of student daily work. Firstly it is a free open software available free of charge under the terms of the General Public License (GNU), allowing to any person with enough programming knowledge can incorporate new characteristics to it. On the other hand, there exist commercial platforms, such as, Blackboard ([2]) and WebCT ([11]) whose license fees are a barrier to their use and their hidden software avoid adapt them to our needs (see [19] for a comparative).

Besides, it is always being improved by incorporating new features (WIRIS to write and executing mathematics ([12]), integrating several CMS, editing LATEX expressions, incorporating "Hot Potatoes" questionnaires ([7]),...). In fact, any extension designed with the standard rules of Moodle, can be directly incorporated to it, and can be used by others users. Moreover, despite being free software, it offers technical support in http://moodle.com/ (see [9]).

Another important characteristic of Moodle is that it runs on most of the existing operating systems as Unix, Linux, Windows, Mac OS, NetWare, and any other system that supports PHP. So, it includes most Web host providers. Data are usually stored in MySQL or PostgreSQL, but it can also be used with a wide range of them (Oracle, SQL, Foxpro, Microsoft Access,...).

Moodle was created by Martin Dougiamas ([5]) in the Technological University of Curtin (Australia), focused on constructivism and cooperative learning that assert the knowledge is built in the student's mind, instead of being transmitted without changes from books or teachings. Incorporating this idea from the time it was designed, nowadays it incorporates many tools for the students to face up the learning environments where teachers expect they can learn.

We must point out that facing up to learning environments is basic for all types of students, but it is essential for both distant and in site students studying independently. In the classroom there are many techniques to promote the activity of a student, but when he is at home, Moodle give us several tools to stimulate his activity.

Another basic property of Moodle is its autonomy. Any educational institution can install and manage its own platform without any cost. It allows that changes to adapt it to their requirements has not interferences with others institutions. Nevertheless, this autonomy is extended to courses, so although some communications can be performed among courses (to share something, it must be explicitly indicated), basically they are independent.

This platform is easy to use and manage (see [19, 14]). There exists many information about it and many users improving it, thus, it constitutes a good election as platform for both e-learning and b-learning.

Others important features of Moodle are:

- It incorporates a formula editor based on Latex, but, some others mathematical editors, as WIRIS, are fully integrated.

- It allows to add pictures, photos, sounds, videos and the linkage of any file or Web page.

Therefore, by using Moodle as a platform in an educational institution, it is possible to unify the presentation of different subjects (scientific, technological, social sciences, arts, music, etc.) into the same platform.

Once you decide to make use of Moodle and install it (teachers usually get it through the educational institution), you must create a new subject and register the student on it. When a student is registered, (s)he gives an email address where all warnings will be sent. An advantage of Moodle, over other LMS built over Java, is the speed of reception for these emails that allows the use of forums in real time without delay.

3 Design of the course

Here we describe our proposed activities to reach the objectives of learning-teaching with in-site students. It must be pointed out that these presential courses are given for nine or four months depending of subject and educational level.

3.1   Objectives

Firstly, we must think about what improvement we can expect with the use of the platform.

In our case we expect:

1. Any student can, at any moment, be informed about program of the subject, schedules, dates of exams and tests, material and proposed activities in the subject. If a student has doubts about some specific aspect related to the subject, a simple look at the platform must solve it. Moreover, it can be specially useful for:

   - Student who has been moved from another educational institution along the course. (S)he can be up-to-date with a simple access to the platform.

   - Student that gets ill and has to work on some part of the course at home, or that uses the platform to facilitate its incorporation. It is ridiculous that hundreds of students' parents must go to the institution to collect materials and activities for their children, in order to facilitate their incorporation to regular classes.

   - Student that does not remember the proposed activities, or has any doubt in the subject.

   - Retaken students who usually do not have in site classes. We can focus their daily work by using the platform.

2. Reinforce the cooperative learning among students by promoting questionnaires, lessons, tasks, forums, a wiki in group and a glossary.

3. Stimulate the daily study by means of activities (questionnaires, lessons, tasks, ...) related to the given topics in the classroom, and with a deadline of about a week from their start. Here we would drive their attention at home, about the more important items on the subject.

4. Give support to retaken student and slower students about those aspects of the subject that differ from the course running.

5. Provide the student with the necessary information to improve his/her knowledge about of those topics that attracts their attention specially.

To obtain these objectives and facilitate their access to the information, we think the virtual subject must be divided in several zones:

- A general zone to obtain the first objective. There the student must find a guide of the course and a index to all ongoing activities.

- As many zones as sections in the subject where objectives two and three must progressively going obtained. In these zones we will go placing the activities related with each section of the subject.

- A summing-up zone where students can give their opinion about their teaching-learning process allowing interesting data in order to improve the future material. This zone is also appropriated to place marks of tests, linkages to interesting material, etc.

3.2   General zone

Once a student has been registered, (s)he can access to the material. We think the design of the subject must have an introduction (general) zone where (s)he can look for and get any general information about the course, introductory material, program of the subject, schedule of the course, tutorship timetable, phone and email of his/her corresponding tutor, materials from previous courses, formulation and solutions of past courses test, so as some general forums:

- **Warnings' forum:** Readable for teachers and students, but only writeable by teachers. On it, all news related to the course can be read in real time (schedule of the course, assessment method, warnings about exams, new material, tasks, questionnaires, lessons, obtained marks or any other proposed activity.). Any changes on the daily running of the subject can be warned to all participants (teacher's disease, changes on date for an activity, etc.). It acts as a notice board for all aspect related to the subject.

- **Suggestions' forum:** Readable and writeable for students and teachers. On it, student are encouraged to make suggestions that can improve the daily running of the course. For example, to include some different colour for new aspects or to put an advice on the warnings forum. We understand this forum as a medium to collect the general difficulties founded when the student is working alone, and (s)he needs some resources and find difficulties to get them. This forum helps teachers to improve the design of the virtual environment, at least, for future learning-teaching activities, but, most of times, to repair them for the present course.

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- **Mistakes' forum:** Readable and writeable for students and teachers. It is foreseeable the material included on the course can get some mistakes. Students will be suggested to open a new theme and discuss about it (sometimes it is not true and there not exists that mistake and the discussion among them obtains the true solution). We think the teacher must keep expectant until the correct solution is obtained, or motivate the continuation of discussion giving clues or finally giving the correct answer as a conclusion when it has not been reached. We think professor must avoid, as possible, say the correct solution, it would be preferable the solution will be obtained by students after discussion. This forum is a good tool for going obtaining the second objective.

- **Past courses' forum:** Readable and writeable for students and teachers. Since a part of the fourth objective is to give a guideline for retaker students, we consider interesting to offer a forum to them. So, they voluntarily can go ahead of the rest of the course and consult their teacher or among them about any doubt they find.

The figure 2 shows the design of this general zone, where the student can immediately find most of the necessary information to face the daily-work on the subject.

We think it is interesting to add some voluntary resources in this general zone, that are a glossary and a wiki. We tested with the use of a chat with no good results. First the interference of many students makes it chaotic, and if few students are involved makes it little or no help to the objectives. However, making on a collaborative form both activities (wiki and glossary) along the year is a good activity for going obtaining the second objective, but since it is an extension of standard running of the course, we think they must not be compulsory, but motived.

3.2.1 Glossary:

A task to be developed by teachers and students, along the course, is to create a glossary (or to improve a previous one) on specific terms used in the subject.

Moodle supplies tools to control the information that student incorporates to the glossary, (avoiding malicious information to turn the experience into a complete chaos) by delayed new information, or as we suggest, until the teacher accepts the new modifications. Obviously, we have opted for a glossary of secondary type (with terminology of Moodle, new information on a secondary type glossary must be ac-
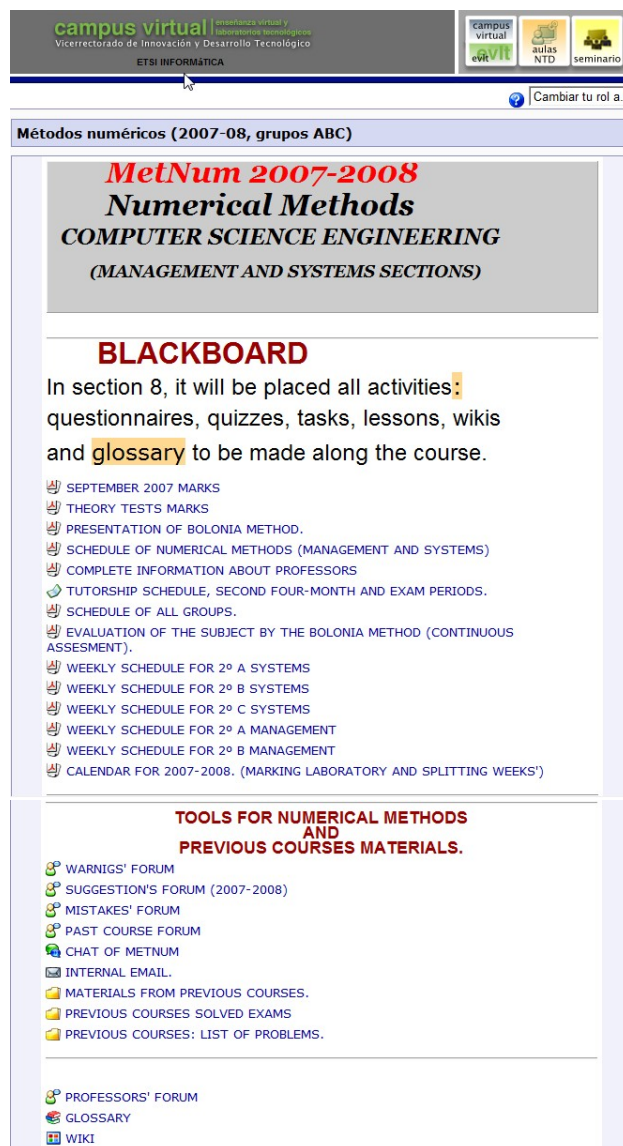
Figure 2: Design of the general zone.

cepted in two phases) where students can include new entries, but teachers must accept them.

In order to stimulate an active response to improve this tool, we suggest to allow its use in some evaluation test and marking positively the activity on this area by creating or modifying some entries. An example of entry to it can be seen in figure 3.

3.2.2 Wiki:

Another method to support the cooperative learning is by using this tool. We think the best method is by doing voluntary groups with three or four students and assigning a section of the subject to each one.

The activity will consist on improving and evaluating the corresponding section of the previous course

Figure 3: An standard item into the Glossary.

Figure 4: An standard item into the Wiki.

Figure 5: Example of a section.

Figure 6: Example of a simple questionnaire.

wiki and adding solutions to previous exams. It must be made along the course and assessed by the teacher that must positively mark the work in this activity.

We think the best option is 'Visible Groups', that allows any student to see and change the contents of the wiki of his group, but only can see the wiki of other groups.

3.3 Section zones

We perform as many zones as sections on the subject.

For each section zone the student will have access to the suggested material and resources for that part of the subject. To give an standard format to the section, at beginning there must exist a link to a main file describing the suggested activities for that section. For instance, the file 'ChapterX.pdf' (usually we use PDF format since it is an widely extended one and has a free reader version) contains a description of all activ-
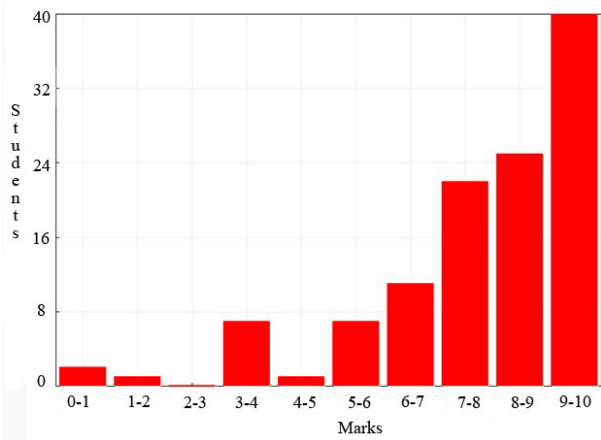
Figure 7: Questionnaire item analysis.

Figure 8: Example of a lesson. Part 1.

ities to be made for that theme. For example:

1) Read pages xx1 to xx2 of the subject book.

2) Read the file 'readX.pdf' (it is included a linkage from the zone to this file).

3) Do the exercises contained in 'ejerX.pdf' (with a linkage to it).

4) Do the activities XA (open until date1) and XB (open until date2).

5) Take part in the forum.

Moodle supplies a wide range of possible activities to direct the attention of student to the more important topics of the section. Nevertheless, it is not necessary the use of all of them ([17]). Moreover, we think it is better to select a limited type of them, so three or four different types of activities is a good election. We suggest specially forums, lessons and questionnaires because they help to the process of self-evaluation and can contain as many questions as necessary to force the study of all important topics.

Regarding the type of questions on questionnaires we specially suggest the multiple choice type, with one or more correct answers, and numeric ones. Concerning the presentation, we suggest question and options shown randomly, so that students cannot cheat easily and this attitude can be easily detected by using some in-site activities.

We must point out have found some problems with questionnaires with numeric answers, where 3 and 6/2 can be considered different. For them is possible to remark the questionnaire automatically or manually. We have adopted the multiple choice and numerical answer types as the basic ones and we recommend them for the objective of guidance of daily-work. Furthermore, they allow to mark the results, and both have an interesting 'item analysis' utility to evaluate answers allowing the early detection of options that confuse them.
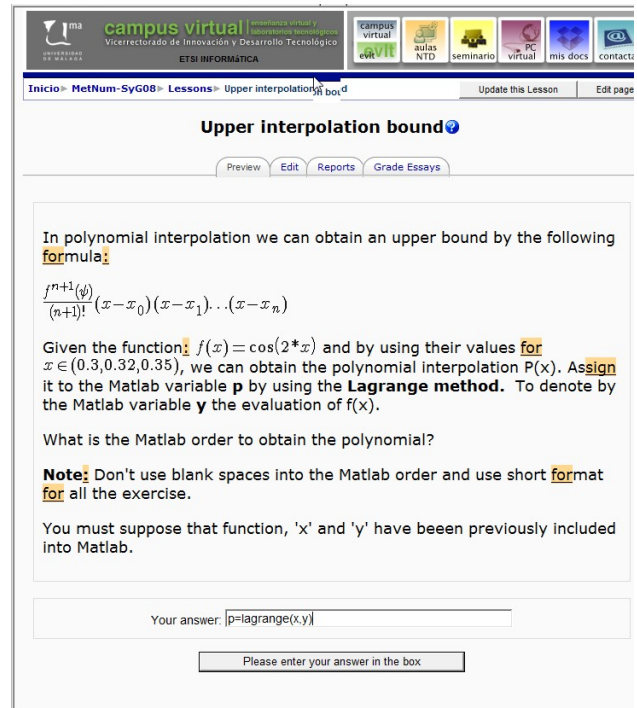
An standard running for a section of the subject (see 5) can be a questionnaire per week, where the autonomous study time of about 1 or $1\frac{1}{2}$ hours including the carrying out of the proposed activity of about twenty minutes.

At the completion of each theme the questionnaire must be replaced by tasks or lessons. An example of proposed questionnaire is shown in figure 7.

Lessons can be used to solve step by step some difficult aspect of the subject. An example of lesson is shown in figures 8, 9 and 10. In that lesson we have chosen a linear design where the student is going from a question to the next one only when the correct answer is obtained, but in others we have opted for a more complicated design of the lesson with several alternative ways depending on the student answer. In [27] is shown as the activity lesson of Moodle can be used in an adaptive way, by selecting the next answer taken in account not only the last answer but all previous ones. We think adaptive e-learning platforms is a promising research area.

We have confirmed that this ongoing try for questionnaires has the effect of activating forums and e-mails about those topics. This is indeed interesting to us as it promotes teamwork (being home alone) and we are not interested, at this stage, in the questionnaire results, we are in the learning process. And this type of collaborative learning is that we want.
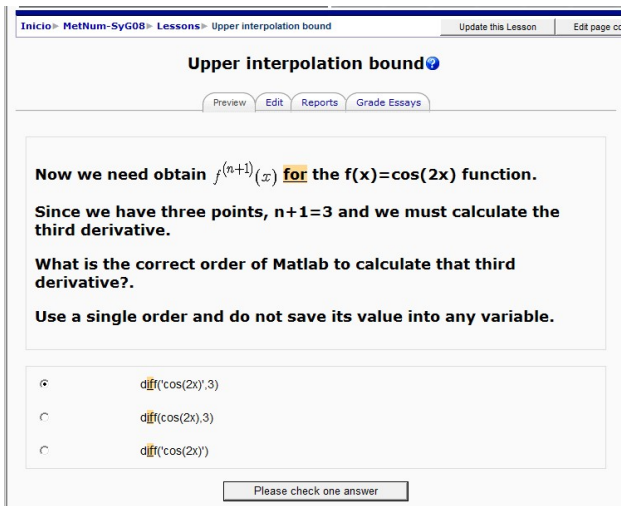
Figure 9: Example of a lesson. Part 2.

3.4 Summing-up zone

We conceive the material in this zone as a conclusion of the activity carry out along the course and divided it into five parts:

Training area: Where questionnaires and others closed activities of the current or previous courses can be continuously solved. They must cover all topics of the subject.

Opinion polls area: This is the appropriate place for opinion polls about the general running of the course in order to correct faults in next courses.

Results area: We think it is also a suitable place to put the key ans marks of exams.

Best works area: In this area we include the best works (usually wikis or workshop) of the present course or from previous ones.

Some interesting areas: We suggest to include links about interesting WEB pages related with the topics of the subject.

4 Conclusion

We have described how students of standard in site regular courses can take benefit from new technology and new advances in e-learning and b-learning. Although these techniques can only be easily carried out on specific institutions, provided with enough new technology resource (ICT), they can be profitably used for almost all students of all levels. In fact, an unique time-limited access to the Web is the only necessary condition to be up-to-date about the subject running. Moreover, by a weekly access, students can benefit from all the characteristics of the proposed model.
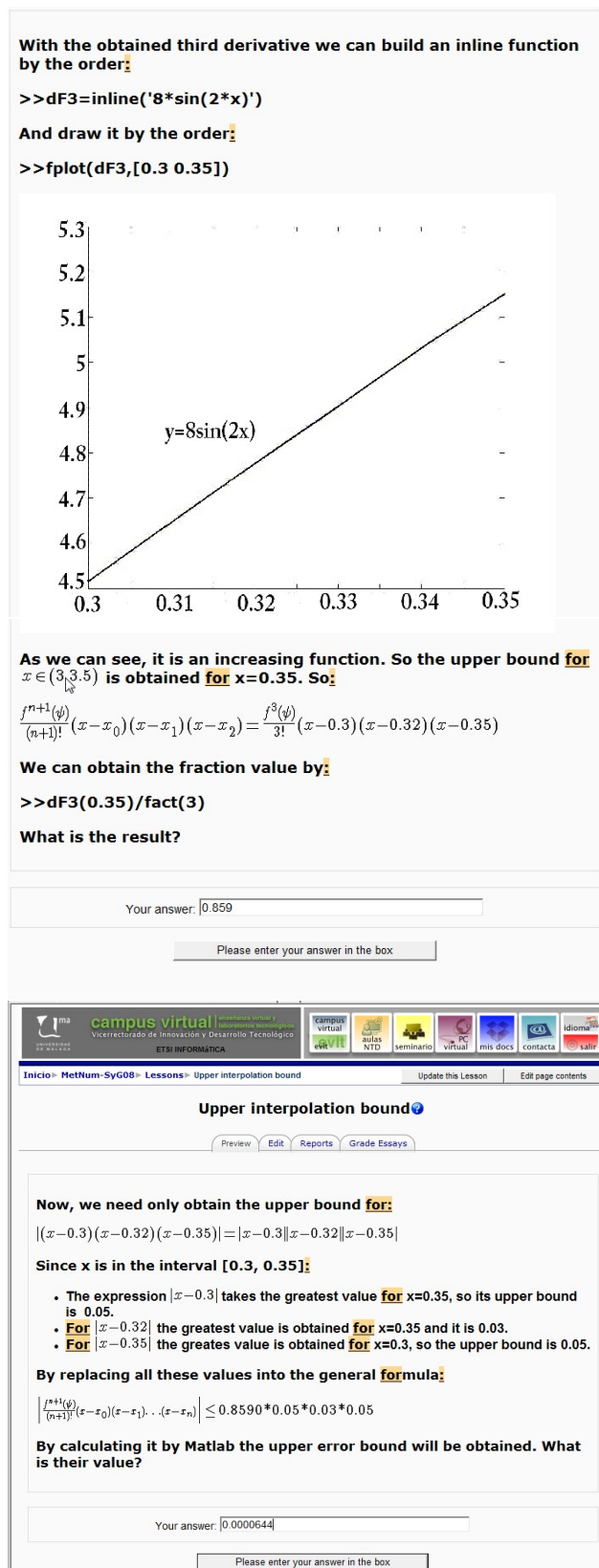

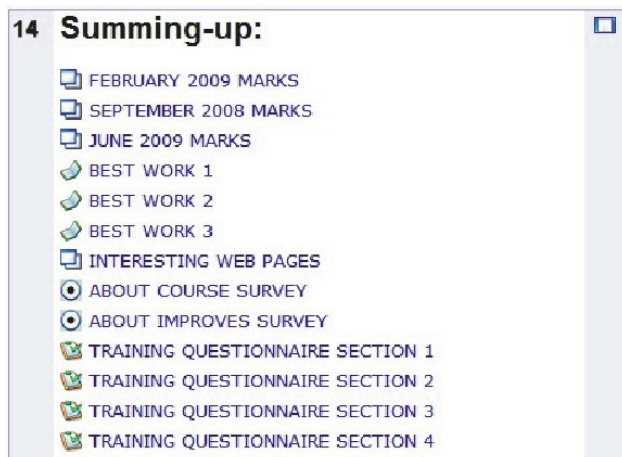Figure 10: Example of a lesson. Parts 3 & 4.

Figure 11: The Summing-up zone.

We have shown some reasons to use Moodle as LMS, and suggested some resources for it, in order to be included in the platform and give a guideline to the students autonomous work at home. We have also shown some results about their use.

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