

An Online Educational Portal for Teachers and Students in a Subject Department

Carmel Azzopardi and Matthew Montebello

Department of Artificial Intelligence, University of Malta

Abstract. Teachers are against duplication of efforts and dislike the sideway clerical duties that use up their resources for doing the proper job — enriching their knowledge and giving pastoral care for their students. The duty of marking attendance, entering marks and subsequently producing a global grade is an important link in the chain of school administration and hence a necessary evil. Today we are in an era enriched by useful technologies and tools that can help in the learning environment. In this paper, an already-existing open-source e-learning software platform is used and manipulated to accommodate the exigencies and specific needs of running a subject department at a post-secondary level in Malta.

1 Introduction

At the Giovanni Curmi Higher Secondary Naxxar, the Physics department caters for students who prepare for the MATSEC (Matriculation) certificate covered in two years and others who need to revise and re-sit for the SEC (Secondary) certificate in order to recover from a previous failure in the subject. The MATSEC certificate offers two levels in the subject, namely intermediate and advanced. Each intermediate and ordinary level Physics group is taught by one teacher while the advanced level group is taught by two teachers who run two different topics in parallel. While each teacher independently runs his/her course, the subject coordinator requires compiling the records given by both teachers per group to assign a final grade every term. Obtaining the relevant records from both teachers in time and using the traditional copy-and-write method is time-consuming, irritating, annoying and probably unwillingly having to chase the persons (who are equally professional) to adhere with stipulated deadlines dictated from the upper level — the administration. The responsible teachers restricted by school-time and their professional duties have to carry this not-so-considered high priority task using an irritating procedure of copying down what they have already done throughout the term.

Teaching as a profession should focus more on the student's needs rather than losing time in transferring records manually from one spreadsheet to another. The continuous physical presence of the teacher in the school is not necessary as professional duties can also be carried out from any location if Web technologies and tools are used. Such tools allow the subject coordinator to retrieve the

required important information automatically without repeated intervention of these teachers. Students can communicate and access learning materials at any time and from any place as well as helping hindered students to make courage and engage in communication behind the barrier of the computer screen and the Internet. The system thus brings efficient collaboration between staff and friendly relationship between teachers and students providing a healthy and prospective learning environment.

Many e-learning software platforms exist which can partially satisfy the above-mentioned criteria as these are designed for university courses. In this environment each lecturer works independently in his/her course structure and thus the lecturer can build up the course, deposit the material, assess assignments and communicate with his/her students. As a result these software platforms allow courses to be designed independently and in isolation from one another. Some of these platforms are open-source and give the opportunity for the user to manipulate and shape the functionality of the system according to specific requirements. Our problem requires the merging of two independent courses run by two teachers in order to retrieve all the marks scored per student from both teachers and subsequently providing a final grade for the term. The project also includes some additional student information that is necessary but missing in the chosen e-learning platform software.

2 Physics department

Students taking advanced level course in physics are assigned in groups and will be having five lessons in theory plus two lessons in practical sessions every week. The five lessons are split into 3-lesson and 2-lesson blocks in both first and second year of their two-year course. In first year, three lessons for Mechanics and two lessons for Waves while in the second year there is Electricity and Heat for the same blocks respectively. Each block is delivered by a teacher who works independently of the other but will have to merge their records at the end of each term.

3 Moodle (Modular Object-oriented Dynamic Learning Environment)

In this study, Moodle is chosen as the learning environment framework to accomplish the requirements of the problem. Moodle is an open-source software framework founded by Martin Dougiamas [Dou07]. The first beta version was released in August 5, 2002 while the latest available version is Moodle 1.8.2 released on July 7, 2007. It runs on many platforms that support PHP (PHP: Hypertext Preprocessor) and stores data in an SQL database. The availability of its source code makes it possible to change, modify and add features into the existing framework in order to customise the product for the satisfaction of the user. Moodle is backed up by an informative website with active forums that help

the user to find solutions to the problems encountered during development and an increasing number of plug-ins being developed by enthusiasts from around the globe. Moodle offers a course management learning environment for online classes offering

- organisation of independent courses,
- different types of assessment activity (offline, upload and inline assignments),
- grading facility for teachers,
- displaying records for students and teachers to consult,
- recourses (like wikis, blogs, chats, forums etc) for an active participation and sharing of information between the participants and
- quizzes such as multiple choice, true/false, short answer questions and more.

4 Customising Moodle for our Institution

The screenshot shows a web browser window titled "New account - Microsoft Internet Explorer". The address bar shows "http://laptop/login/signup.php?". The page content includes a navigation menu with "GCHSS", "Login", and "New account". A language dropdown menu is set to "English (en)". The main form is titled "New account" and contains two sections: "Choose your username and password" with fields for "Username*" and "Password*", and "More details" with fields for "Email address*", "Email (again)*", "I.D. or registration number*", "Group number*", "First name*", "Surname*", "City/town*", and "Country*" (a dropdown menu). At the bottom of the form are "Create my new account" and "Cancel" buttons. A red asterisk message at the bottom right reads "There are required fields in this form marked*". The Windows taskbar at the bottom shows several open applications, including "Paper writing - Mic...", "Paper for csaw sy...", "Course: Moodle Fe...", "Shortcut to xampp...", and "New account - ML...". The system clock shows "10:44".

Students are registered to the course using an official identification number (I.D.) and are assigned a group number. The department sorts students by groups and similar names are identified by the I.D. number. Moodle provides an I.D. number field but is only accessed from profiles menu. We require the student to enter all relevant information as he/she creates a new account. The fields for I.D.

or registration number and group number are added. The page is also set to check for a unique I.D. number in which case the student is referred to the administrator or to re-enter the number correctly.

Teachers are assigned a course by the administrator and each has rights to master their part independently from one another. Lesson material, assignments and news are easily uploaded to the site for the student to watch and download. The coursework and tests are corrected and graded online. The students can see their individual grades while the teachers have the full-view for each group. In our situation the students must enroll to two courses that belong to two different teachers — First-year students for Mechanics and Waves while second-year students for Electricity and Heat. Each course is protected by an enrolment key supplied by the respective teacher. Subject coordinator is able to retrieve all the marks gained by each student in one spreadsheet file. Moodle exports the results in three file types — ODS, excel and text. The excel type is chosen for our project because one can easily produce statistics and charts in its application.

The screenshot shows a web browser window with the URL `http://laptop/grade/index.php?id=7&action=vcats&view=uncategorised`. The page title is 'PHY01: Grades - Microsoft Internet Explorer'. The breadcrumb trail is 'GCHSS > PHY01 > Grades > uncategorised'. There are several navigation buttons: 'View Grades', 'Set Preferences', 'Set Categories', 'Set Weights', 'Set Grade Letters', and 'Grade Exceptions'. Below these are three download buttons: 'Download in ODS format', 'Download in Excel format', and 'Download in text format'. The main content is a table titled 'uncategorised Grades' with a help icon. The table has columns for 'Student', 'MECH2', 'MECH1', 'WAV1', 'Total', and 'Student'. The data row shows 'Azzopardi, Carmel' with scores of 53, 92, 48, and a total of 193. There are also 'Sort by Lastname' and 'Sort by Firstname' options for both sides of the table. At the bottom, there is a 'Moodle Docs for this page' link and a 'You are logged in as Admin User (Logout)' message. A 'PHY01' button is visible at the very bottom.

Student	MECH2	MECH1	WAV1	Total	Student
Azzopardi, Carmel	53	92	48	193	Azzopardi, Carmel

The combination of records from two separate courses is not available in Moodle but can only display record from one single course. The modification in the program is carried out in such a way as to leave the existing framework for the normal operation of individual courses but will be able to combine results and subsequently using the same existing channels to produce the output. Such operation will be restricted to the subject coordinator with administration rights and will be protected by an enrolment key. This operation of combining results is carried out from a course addition named 'FIRST YEAR' and another 'SECOND YEAR' constrained by the short names PHY01 and PHY02 respectively. Such codes are very important to be recognised by the conditional statements in the PHP code. Similarly the physics courses are also constrained by the short names

MECH and WAVES for the first-year courses and ELEC and HEAT for the second-year courses.

The results can be exported to Excel format with the most relevant data entered by the student and his/her teachers as shown below. The learning environment

	A	B	C	D	E	F	G	H	I	J	K
1	I.D. or reg	Group num	First name	Surname	Email addr	Assignment: MECH1 - Max: 100	Assignment: MECH2 - Max: 100	Assignment: VA11 - Max: 100	Total		
2	205366M	A2.2	Carmel	Azzopardi	carmar66@	92	53	48	193		
3											
4											
5											
6											
7											

may be expanded to cover other departments. For single courses, moodle requires no changes or alterations but for the combination of courses, the administrator will require the modification of the conditional statements already in place for the physics department and will have to be careful to keep to already-established short names.

5 Discussion and Related Work

In this age of advanced technology and sophisticated machines, the need for continuous education is accepted by the large majority. Education is not only attributed to the young age but is also attracting adults who are committed to their jobs and businesses but seeking to further their studies. This is the philosophy of lifelong education which is the key to survive and evolve in one's own career. Cross [Cro06] argues that knowledge becomes obsolete in few years time since the pace of knowledge change is accelerating. In the past, one learned the method of doing something, thus required knowledge and skills while in the future one will have to learn what changed since last night and therefore requires innovation and ingenuity. In the not-so-distant past, distance learning used postage system to reach the committed adults to continue their studies at their own pace, in their own free time and in the luxury of their own homes. Nowadays the explosive growth of the Internet and the various existing and evolving technologies influenced the learning methods. Choy [Cho07] argues that e-learning (electronic learning) changed the medium of communication between the course organiser and the learner bringing the benefits of fastness, face-to-face participation and a huge repository of easily-accessed knowledge. He continues by quoting other authors that e-learning comprises the integration of three elements — content, technology and services. The technology should be limited to help learners while the teaching approach should be very important. Alsultanny [Als06] points out the benefits of e-learning in corporate environments mainly saving on costs in travelling and venues and gaining in more production time as the employees

do not have to leave their office. Attwell [Att07] stresses the usefulness of PLE (Personal Learning Environment) to future learning which helps the learner in developing an environment that suits his/her learning style. The concept utilises the use of social software (using computer network to visit services for accessing content and reaching other people).

Tweddell Levinsen [TL07] reminds us of the presence of two groups of people in ICT (Information and communication Technology) competencies. One group has acquired the skills in their lives while the other found the technology already in place before they were born. The author points out that both organisations and teachers are not ready for the change and adaptation of ICT. He insists that both sides can win this challenge through collaboration and knowledge-sharing. Tweddell Levinsen [TL07] states that although the use of ICT has grown among teachers, it is still mostly used for course organisation, administration and sharing of material. A change in culture is required for the new way of learning as a result of a looming information society. Learning must not remain a process of grasping and understanding content but a process showing the characteristics of adaptability and readiness to new problems by mastering the content independently.

Berners-Lee et al. [BLHL01] suggests an evolved type of Web (Semantic Web) having the capacity of processing information on behalf of the user making searches more relevant and useful. Alsultanny [Als06] lists several advantages of the Semantic Web to the e-learning context.

- Intelligent searching for content through the use of ontologies.
- Student has a personal agent cooperating with other agents for fast retrieval of material.
- Querying and navigation related to goals.
- Dynamic learning environment.
- Learning content created by the interaction of learners and educators.
- Individualised and personal learning.

Robberecht [Rob07] argues that computer-based learning materials offer linear (or sequential) approach where the learner is exposed to a sequential pedagogical experience with content displayed as one page after another. This type of model gives the same learning path for all learners except for the learning pace. The author recommends the non-linear design in which the learner determines his/her learning path on a personal and individual basis. This design incorporates interactive material containing context-sensitive and active elements to accommodate various levels and styles of learning. The difficulty of such design is the problem of teachers lacking programming skills while the technical people do not have the pedagogical expertise. The non-linear model accommodates any type of learner with a path and pace solely determined by the learner himself/herself. Information must be rationally linked to other information packets in such a way to provide a coherent learning experience that can be implemented by authoring tools (an application composed of linked objects like text, images or multimedia). Such tools help the educator to design active (based on doing and speaking) and passive (based on reading and seeing) learning.

Holger [Hol04] argues that information is doubling every two years and ironically its over-abundance is causing discomfort as we sift through the information to retrieve what we need. In the past, when information was stored in books and other printed material, a cataloguing system was used to lead to a shelf number and then the topic in the index of the book. The electronic information may be organised in a similar way by *topic maps* that provide the link between the domain of knowledge and information management. Topic maps are explicitly modelled ontologies capable of driving intelligent search engines and content management systems. Commercial publishers are interested in the technology to add value to their content, web portal providers will be able to organise their web sites with clear navigation patterns and in call centres they give support to the operator or directions to the client for the relevant answer to his/her query.

Olsevicova [Ols06] visualises the need of a virtual study environment based on Semantic Web and using topic maps as the solution to channel to all information and knowledge resources of the educational institution. The virtual study environment will apply topic maps technology in order to help students understand the structures of the course, teachers can recommend a study flow and all relevant parts of the course are unified together thus reducing the number of clicks required.

Evans and Bellett [EB06] discuss the outcome of a research carried out on two projects aimed at getting primary teachers to collaborate online for the development of teaching skills in two different subject areas — teaching maths to mixed-aged classes and developing teaching material for religious education. The comparison showed fruitful results for the project coordinated by an advisor with regular group sessions but lethargy proliferated among the participants of the other project which was conducted via a web-based discussion and detailed leaflets. The authors claim four necessary ingredients for successful establishment of e-learning communities namely face-to-face meetings; high-quality IT support; participants' involvement and sharing of experiences; appropriate funding.

The invention of machines and robotics brought job cuts in the industry sector because the machines can do manual job quickly, reliably and for many hours without breaks. Will history repeat itself in the education environment? In a survey conducted by Wang et al. [WFSG03] found that e-learning did not replace traditional learning. They were studying employees in organisations who embarked on e-learning programs for their career advancement. The main reasons for quitting e-learning programmes were lack of motivation, learning style mismatch, same remaining workload and time dedication. Schmidt and Werner [SW07] claim that the main culprit is the human interaction factor, lack of discipline and motivation. As a result they propose blended learning which uses the advantages of face-to-face interaction and online instruction. Barrett et al. [BRM07] report a study on the effect of students' attendance to classes in a blended learning environment that supplied course material for self-learning. The study showed no correlation between attendance and assessment gain. The authors concluded that the lack of attendance is an always-present phenomenon and commitments and external pressures were the true reasons for such be-

haviour. Although the Managed Learning Environment (MLE) compensated for skipped classes, both teachers and students appreciated the importance of the traditional way of learning.

Many educational institutions are experimenting with online e-learning environments to reach potential learners who are committed to their jobs but ready to further their studies and providing additional support to regular students who attend classes. The e-learning environments require the support of Web technology, communication facility, multimedia, assessment support and database tools. Various software products, proprietary and open-source, are available using popular Web browsers for the user front-end, server-hosting application and database tools. All the software platforms are intended to master the organisation of independent courses administered by one educator and provide collaboration between the teacher and his/her students. There is no facility for the administration of split courses running in parallel by different teachers to be finally merged together for the issuing of a global record at the end of the term.

6 Conclusion

In my sixteen years of teaching experience, Web technology has not yet infiltrated into the teaching profession. The younger generation of teachers use their personal computer for the organisation of content material, enriching their knowledge and keeping students records. This attitude is rather a substitute to the pen-and-paper method and not an appropriate exploitation of the technology. The time consumed and duplication of work for the administration of records is not reduced. Web technology gives the power to the user to access material from any location at any convenient time. Why do teachers have to remain immobile at their place of work? How much quality time do teachers really give in a noisy and distracted staffroom environment deprived of Web resources? Teachers need the premises for delivering lessons, meeting together for staff development and establish contacts with their students if enquired. The rest of the profession can be done very effectively from any place with the help of a virtual learning environment.

7 Future Work

We shall put the system online (using the department's computer as a server) and test it for the coming scholastic year at the Giovanni Curmi Higher Secondary Naxxar for the physics department. In future, the benefits of the system may be sufficiently attractive to urge other subject departments in the same school to participate.

Each subject department in this school is expected to hand over to the school administration a formal assessment report carrying the following criteria: 50% for test/s, 40% for course work and 10% for attendance. There will be three reports for the first-year students and two reports for the second-year students. The second report for the first-year groups should not include the marks scored

in the first report while the final report will carry the average of the three formal assessment marks. The final report for the second-year groups is concentrated on the end-of year test and formal assessment grade obtained in their first year and first term of their last year. We shall focus on the possibility of publishing this formal assessment in excel file according to the criteria.

This project may take a direction in exploring the possibilities of using further technology to implement the attendance record system. A Personal Digital Assistant (PDA) may be used by teachers in their class for recording the attendance and then conveniently sent to central administration for further processing. The attendance records will also be used for the formal assessments without further manual inputting. The PDA may also serve the teacher for inputting marks while correcting scripts and then transmitted to the department's course management system.

References

- [Als06] Y. Alsultanny. e-learning system overview based on semantic web. *The Electronic Journal of e-Learning*, 4(2):111–118, 2006.
- [Att07] G. Attwell. The personal learning environments — the future of elearning? *eLearning Papers*, 2(1), 2007.
- [BLHL01] T. Berners-Lee, J. Hendler, and O. Lassila. The semantic web. *Scientific American*, 2001.
- [BRM07] R Barrett, A Rainer, and O Marczyk. Managed learning environments and an attendance crisis? *The Electronic Journal of e-Learning*, 5(1):1–10, 2007.
- [Cho07] S. Choy. Benefits of e-learning benchmarks: Australian case studies. *The Electronic Journal of e-Learning*, 5(1):11– 20, 2007.
- [Cro06] J. Cross. The low-hanging fruit is tasty, internet time blog. <http://internettime.com/?p=105>, 2006. Accessed 18 June, 2007.
- [Dou07] M. Dougiamas. Moodle. <http://moodle.org>, 2007. [Accessed 10 July 2007].
- [EB06] R. Evans and E. Bellett. Establishing effective e-learning communities within the teaching profession: Comparing two projects to discover the necessary ingredients. *The Electronic Journal of e-Learning*, 4(2):119–126, 2006.
- [Hol04] R.H. Holger. Topic maps are emerging – why should I care? http://www.idealliance.org/papers/dx_xmle04/papers/03-01-03/03-01-03.html, 2004. Accessed 26 June 2007.
- [Ols06] K. Olsevicova. Topic maps e-learning portal development. *The Electronic Journal of e-Learning*, 4(1):59–66, 2006.
- [Rob07] R. Robberecht. Interactive nonlinear learning environments. *The Electronic Journal of e-Learning*, 5(1):59–68, 2007.
- [SW07] J.T. Schmidt and C.H. Werner. Designing online instruction for success: Future oriented motivation and self-regulation. *The Electronic Journal of e-Learning*, 5(1):69–78, 2007.
- [TL07] K. Tweddell-Levinsen. Watch out — the power users are coming. *The Electronic Journal of e-Learning*, 5(1):79–86, 2007.
- [WFSG03] G. Wang, D. Foucar-Szocki, and O. Griffin. Departure, abandonment and dropout of e-learning: dilemmas and solutions. Technical report, Masie Center E-Learning Consortium, 2003.