Using Moodle, an open source learning management system, to support a national teaching and learning collaboration.

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Abstract: *Mining Education Australia (MEA) is a consortia of three of the major mining schools in Australia and provides a unified third and fourth year curriculum for the mining engineering degree for 90% of Australia's mining engineers. A fourth institution, the University of Adelaide, will be joining MEA from 2009. This paper provides an overview of the issues MEA faces as a collaboration in supporting teaching and learning activities for students across four partner institutions. The paper discusses MEA's adoption of Moodle as its Learning Management System. It explores the pros and cons of open source products and the strategies necessary to ensure successful adoption across multiple campuses. The paper provides a rationale for MEA's selection of Moodle as its LMS, the opportunities this choice provides and outlines the strategies put in place to ensure its successful uptake.*

Introduction

Mining Education Australia (MEA) is a consortia of three of the major mining schools in Australia; Curtin University of Technology's Western Australian School of Mines (WASM) in Kalgoorlie, The University of New South Wales' School of Mining Engineering and The University of Queensland's Faculty of Engineering – Discipline of Mining Engineering and Minerals Process Engineering. The University of Adelaide will be joining MEA as a full partner in 2009. The consortia was established by the Minerals Tertiary Education Council to address issues related to the provision of mining education for mining professionals identified in the 1998 discussion paper `Back from the Brink'. These issues included;

- A decline in the number of mining engineering schools offering a full four year program
- A decline in the number of student graduates
- A decline in the number of mining engineering academics and an corresponding increase in average the age of mining engineering academics
- A decline in the number of students completing PhD's on mining related topics.

The current mining boom has changed the picture considerably, contributing strongly to an increase in the number of graduates, and the emergence of new mining schools and programs such as the University of Adelaide and the University of Western Australia. Nonetheless, the issues of declining academic staff numbers and limited PhD enrolments remain key challenges for providers of mining education. In addressing these issues MEA's major objective was to offer a common third and fourth year mining engineering program. The rationale behind developing the educational program for years three and four of the mining education program was that in all cases much of year one and two courses are service taught in the partner Universities and consist mainly of maths, physics, computing and design courses.

The real potential of the MEA initiative lies in it being able to realise the full educational potential of a truly collaborative teaching and learning environment where academic staff are shared across institutions; alternative and innovative delivery and learning methods are implemented; and there is a greatly expanded collaborative student experience between each participating node, including potential for remotely located students to also engage with the Program. Opportunities exist, particularly in the fourth year courses and electives, for real and effective innovation, (CASR application 2006). These opportunities also provide avenues for addressing shortfalls in staff expertise at individual institutions.

MEA's teaching and learning philosophy.

In developing the common curriculum for the third and fourth year of the mining education degree, MEA adopted a more social constructivist approach to teaching and learning. This perspective places greater emphasis on the collaborative aspects of learning and draws on Vygostky's (1978) views, that social interactions form a vital part of the learning process. In a constructivist learning environment, learning is an active process, enabling learners to build on existing knowledge and understanding to negotiate new understandings and knowledge. A social constructivist approach to teaching and learning can include such things as reciprocal teaching, peer collaboration, problem based learning and other activities that involve people learning from the experience of others (Schunk, 2000). Thus, MEA integrated more project, case-based and collaborative learning approaches into the new program and saw considerable opportunities in extending these social learning opportunities to include cross-institutional teaching and cross-institutional project teams.

MEA has also adopted a more social constructivist approach to course development. All MEA core and elective courses are developed in teams. Wherever possible a staff member from each university is allocated to each relevant course development team. This enables staff at the different universities to pool their expertise and resources to develop higher quality courses. Hence the uniqueness of a collaborative team based approach to developing a course. The common curriculum is well understood by all team members and provides unique opportunities for cross-institutional or reciprocal teaching (Schunk, 2000). It also provides opportunities for cross-institutional small group student projects.

The first MEA courses were offered in semester one 2007. The introduction of these courses was a major effort in itself – the concerted collaborative effort needed to produce learning guides, course outlines and assessment tasks common to the three institutions in addition to other duties was a major undertaking. It was a unique experience for most staff who in most cases were previously responsible for their own individual course relying on their own individual teaching style.

During semester one each university offered its courses via their own learning management system (LMS); Vista at UNSW, Blackboard at UQ and WebCT at WASM. Mining staff were earlier adopters of the LMS approach - maybe not to their full capacity but websites were a part of most courses and MEA courses were designed to make more use of the LMS tools especially those that support collaboration. The obvious disadvantage to MEA of using three different LMSs was the need to maintain three copies of each course across the three Universities. It is very time intensive to ensure each site had the same and current material available. The other major disadvantage, and one which was really against the original principles of MEA, was the lack of ability for students and staff to collaborate on teaching and learning activities. There was no simple way of allowing all students access to one institution’s LMS because of enrolment complexities. However the duplication of activities did mean that students were not disadvantaged.

Searching for a solution to cross-institutional collaboration

With the commencement of the MEA initiative in 2007 it was originally intended that we would manage the three sites across the three universities for all students while a solution to cross-institutional enrolments was identified. What is meant here was that each MEA partner would manage one or two courses and allow students from the other two partner universities to access them. This would mean one site to manage and keep up to date. Students could undertake collaborative activities via this site. In theory this was a great idea - even with different LMSs, they were similar enough for students to use effectively. In practice it did not work because allowing students access to an LMS from another university is a complicated process. LMSs are designed to work with students enrolled at that specific university. To allow external access requires complicated guest access or the need for students to enrol at three different universities, requirements that are quite impractical, particularly with many total course enrolments close to two hundred. Hence semester one continued without the option for major collaborative exercises to be undertaken. The collaboration remained essentially within the home university.

At the end of the semester one, 2007 progress review, it was unanimously agreed by MEA staff that if cross-institutional collaboration was to be successful, then another solution had to be found. The maintenance of three separate LMSs was not an efficient solution. It was too time consuming and was very difficult to ensure the latest information was available to all students and was a barrier to teaching and learning across the institutions. An investigation commenced to find a solution. The intention was to enable staff and students to access all MEA resources seamlessly and to interact collaboratively using a single sign-on identity.

Initially an MEA project team explored the concept of using Shibboleth technology to address this issue. Shibboleth allows the secure passing of identity information between institutions and service providers (JISC 2006). It is very widely used in the UK. More information on Shibboleth can be found at http://shibbbboleth.internet2.edu/.

While Shibboleth could be seen to feasibly solve the cross-university enrolment problem, it did not address the issue of cross-institutional staff or student collaboration. Ideally one learning management system was required. Unfortunately, the licensing arrangements of corporate solutions such as Blackboard, makes a corporate LMS solution financially untenable for programs with relatively small student numbers such as MEA. After some enquiry, it was suggested that MEA explore the use of Moodle, an open source LMS as a possible solution. Given its wide take-up across the sector internationally, (http://moodle.org/stats/) including high profile distance education institutions such as the Open University in the UK and the University of Southern Queensland in Australia as well as its basis in a social constructivist approach to teaching and learning, Moodle appeared an appropriate LMS open source software tool to explore for MEA. The incorporation of collaborative tools such as easily used discussion forums and wikis were also seen as desirable elements.

Open source software tools

Moodle is an open source LMS. Open source is software whose source code is made available at no cost. Users are also usually free to make whatever changes they see fit to the code (Wheeler, 2007). Open source enables the ability to modify and change code to meet the particular needs of individual users and or the user community. In this way open source can be seen to have many elements of constructivism, including social negotiation and knowledge building.

Advantages of open source software tools

There are many perceived advantages of open source software tools. The ability to customize open source software to local requirements and then return these customisations to the source if desired is a recognised advantage of open software tools (Dooley). Open source software also comprises the ability for the software not to be platform dependent and to easily link to other open source software which can provide access to mainstream and experimental addins (Dooley, 2006). There are also

several other recognised advantages, which make open software tools an attractive option for end users. These include:

- Lower software costs
- Simplified licence agreements
- Potential for scaling/consolidation
- No vendor 'lock-in"
- High quality software (Williams, Clegg and Dulaney, 2005).

Disadvantages of open source software tools

While the advantages of open source software can be seen as attractive there are also well recognised disadvantages of open source tools. These include:

- 'Hidden' costs such as training, implementation, etc
- Limited service and support
- Difficulties identifying the latest version of the software
- 'A work in progress'
- Lack of access to training (Williams, Clegg and Dulaney, 2005).

While many of these issues have impacted negatively on open source software solutions in the past, many companies are now offering support services and training for modest costs, well below the licensing fees of corporate brands. Efficient project management also means that different versions of the software are made available to users depending on their needs and requirements. Changes to the open source packages are announced as new versions and users are free to select the versions that suits their needs best.

Popularity of Moodle

Until recent times, open source tools were not commonly used to support large scale teaching and learning activities, as the issues outlined above caused difficulty in successful uptake. However the scene is changing rapidly with open sources tools becoming more stable. The rapid growth and popularity of Moodle can be seen in the table below, comparing growth and usage between January 2008 and August 2008.

Table 1: Growth in Moodle usage between January 2008 and August 2008

Moodle usage	**January 2008**	**August 2008**
Registered sites	37,746	48,208
Courses	1,670,689	2,147, 178
Users	16,458, 175	22,427,774
Teachers	1,817,686	1,923,544
Enrolments	19,009,567	21,604, 229
Forum posts	19,695,318	27,572,640

(http://moodle.org/stats/)

Further to this (Rosen 2006, in Winter, 2006) showed that even at that stage (January 2006) Moodle had more than 50% of the market share of LMS deployment across the world.

However, it must be remembered that even though Moodle is becoming well accepted, up until recently most tertiary institutions have used the mainstream commercial applications essentially offered by one company, Blackboard. These LMSs are the result of many millions of dollars investment. They are mostly well established with a strong academic following and universities using these tools generally provide extensive user support for both staff and students. Corporate LMSs basically provide a stable and usable environment. Nonetheless, there are considerable limitations in their ability to respond to users needs and they cost an enormous amount in licensing fees, installation and maintenance, causing institutions to consider other options.

Moodle Trial

To undertake a full investigation of its applicability to MEA it was planned to host one semester two, year three elective course: Underground Mining Systems. This course had an enrolment of ninety five students. The course itself is project based with only a few formal lectures. The course was selected for the trial as the project based format lent itself to cross-university collaboration and the staff involved where willing to participate.

As mentioned earlier one major aim of MEA is the ability to allow all students access to academics and other experts in the field irrespective of their physical location. The trial course provided a timely 'experiment' in this area. It was decided that each lecture given in Underground Mining Systems irrespective of the University in which it was located would be videoed and a podcast produced. The podcast would then be loaded into Moodle for students at the other two Universities to view.

The use of podcasts to enhance learning is another rapidly emerging area but it has been used in a number of on campus courses at both UNSW and WASM and there was adequate expertise available to help us produce a limited number of podcasts. Lectopia has been used at UNSW for three years but is usually only audio plus slides. MEA's approach was to video the presentation with the powerpoint slides added later.

Staff and student feedback on Moodle

From the student perspective it all worked surprisingly well as indicated by the end of semester student evaluation comments. However there were concerns from WASM students in relation to the download of podcasts as WASM does not currently have access to AARnet broadband services. This resulted in the lecturer downloading the podcasts onto a local server for student access.

The end of Semester two, 2007 course review, attended by all MEA staff, provided an opportunity for staff to give feedback on the experience with Moodle. It was generally felt that it worked well and enabled the first opportunity for students from the three original partner universities to work together although no cross institutional projects were included in the first instance the 2008 Thesis is the first truly collaborative student use of Moodle). However some issues needed to be addressed to enable smooth operation. One of these was to ensure that the Adobe versions at each local area were the same, otherwise the files were corrupted and unreadable. Staff also commented that it was unfortunate that Moodle doesn't allow teams a dedicated blog space (which is secure only to their group). Such a feature would have supported more effective use of Moodle. This aspect of Moodle has been addressed in the most recent version. It is also important to remember that users can develop and incorporate code to address issues such as this.

Providing cross-institutional support for Moodle

At the end of 2007course review meeting, following on the successful trial of Moodle, it was agreed that MEA would adopt Moodle as its learning management system. As none of the partner Universities had the necessary skills or experience with Moodle to provide user support it was decided it would be hosted by a commercial group, Netspot Pty Ltd, located in South Australia. Netspot Pty Ltd is connected to the AARnet backbone, an important aspect in selecting a hosting service as this meant accessing Moodle via Netspot did not impact on student download quotas, which can be a major issue. As well as offering hosting services, Netspot Pty Ltd also offers extensive users support for a modest fee – essential to a program such as MEA and provides training.

In order to support Moodle in each partner University, it was decide to train a 'Moodle Master' for each institution. These 'Moodle Masters' would then develop their skills sufficiently to provide support and assistance for other staff in their institutions. All 'Moodle Masters' participated in a full day's training at Netspot prior to the introduction of Moodle. Some staff are apprehensive about he move to Moodle – another thing to learn/do and it is intended that the 'Moodle Masters' and Netspot support should provide adequate support to make the change.

Lessons learnt

While MEA has a standard 'look and feel' for its website, this was overlooked in the adoption of Moodle. It is important to have a standard theme or template for all courses enabling staff to add materials as required.

It is important to provide support for students. Although just another LMS, there are noticeable differences from the other LMSs students are more familiar with. The provision of a "get started guide" on the front page of the website would overcome most student problems with Moodle. Students also need advice on minimum system configurations, for example, Adobe, as some had very old versions, which caused incompatibilities.

Ongoing communication between staff on course teams is essential to ensure staff agree on what is loaded and when it is made available, etc. To help address this issue, a staff only general site has been created in Moodle to encourage discussion between staff.

Conclusions

It is apparent that Moodle will successfully support collaborative teaching and learning across the now four partner universities. On the basis of the success of the trial MEA formally adopted Moodle as its LMS. However it remains to be seen how successful the strategies MEA has put in place such as the Moodle Masters and Netspot support are in supporting Moodle across MEA. The success or otherwise of the implementation of Moodle and the ability to support cross-institutional project teams will be fully evaluated at the end of semester two, 2008.

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