Early Warning System

Vineet Singh, Bibhya Sharma, Jokhan Anjeela, Shaveen Singh
Faculty of Science, Technology and Environment
The University of the South Pacific
Laucala Bay, Fiji
{singh_vn, bibhya.sharma, anjeela.d.jokhan & singh_sv}@usp.ac.fj

Abstract— *There is a lot of emphasis nowdays on online management system for teaching and learning. The shift in the pedagogy invariably warrants innovative ways of monitoring student progress in the new and exciting ICT driven learning environment. Early Warning System (EWS) piloted at The University of the South Pacific (USP) monitors student progression using the history of interactions, completion and course achievement as indicators of satisfactory or unsatisfactory performance. Incorporated within Moodle, the real time progress tracking system helps identify underperforming students so that corrective measures and actions can be taken before it is too late. Students are flagged on incomplete tasks, alerted on lack of engagement with online activities, and informed on the progress made on popular course activities. Course coordinators are able to identify student learning patterns and group similar learners, which is a difficult task especially in large classes. The model will also assist the coordinators in evaluating and maintaining courseware by identifying effective and ineffective course activities. The paper presents the implementation report of EWS at USP, highlighting its share of strengths and opportunities.*

Keywords*— *Moodle, Monitor, Early Warning System, Interaction, Alert

1. INTRODUCTION

The advancement and proliferations of Information and Communication Technology (ICT) in education has resulted in the birth of new modes of delivery. With the traditional modes (Face-to-Face), non-traditional modes such as online and blended on Electronic Learning (eLearning) platform have sprouted much to the pleasure and satisfaction of all relevant players in the education sector. [1] This change has invariably enhanced learning, however, it raises a question as how the students can be monitored in the eLearning mode.

Student monitoring is vital to get the status of the students in their courses and programme. This monitoring has a lot of benefits such as how it can identifying students with similar characteristic and eventually assist them in areas the students are not doing well or alert them in a particular incomplete task(s). Currently, the mid-semester and end of semester report are generated which only give a snapshot of the class results. This may be too late to take any corrective action. There should be progressive monitoring done to get the students standing and early interventions can be taken for the at-risk students. [3]

In Maharashtra India, a system called Chaatra which is a student monitoring and learner modelling system that uses existing student results in tests and quizzes to build their learner profile. It informs students about their relative class participation in discussion forums and online conversations which encourage them to make amends and get more involved in class discussions and debates. It also informs students of their strengths and weaknesses in a topic, and recommends remedial measures where applicable. Course coordinators are able to identify most visited pages, see individual student's progress in qualitative form, and view comparative performances of groups of students in a topic. It also provides valuable information for revision of content and teaching strategies. [4]

The University of the South Pacific (USP) Strategic Plan 2013-2018 calls to expand the implementation of Moodle as a learning management system for teaching and learning. This expansion raises the question how to monitor and assist the students on an elearning platform. This is the main focus of the paper. USP is one of two regional universities in the world and is supported by 12 Pacific Island Countries - Cook Islands, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu and Vanuatu. A total of 14 campuses and 8 smaller centres are spread over an area of 30 million square kilometres of the Pacific Ocean. Due to the spread of the campuses and centres, the University has a major emphasis in eLearning and promotes this by having courses in blended and online modes along with the traditional face-to-face mode.

This paper essays the introduction of an early warning system in the Faculty of Science, Technology and Environment of USP and considers its progress, challenges and opportunities based on data from pilot runs and associated surveys and evaluations.

2. EARLY WARNING SYSTEM (EWS) IN USP

The emergence of eLearning in USP has introduced significant improvements in the way courses are designed and delivered, making this new form of education widely accepted [5]. ELearning systems provide multiple ways of learning (self-paced, collaborative, synchronous & asynchronous, tutorial-based, etc.) and incorporate numerous interactive online activities. Therefore, articulating and identifying user behaviour in the eLearning systems can provide new insights into and improve understanding of how students view and undertake the web-based learning tools and activities. Data garnered in the system, such as login frequency, participation indexes, completion rates could greatly aid in identifying satisfactory and unsatisfactory performances.

The EWS at USP therefore aims to be a monitoring and feedback tool for early intervention and to identify at-risk students during the semester such that corrective actions could be taken before it becomes too late. With many courses venturing into online mode, this self-enthused approach is also believed to be more proactive as students can self-monitor their progress and take required corrective measures.

The EWS has two phases for the overall completion and implementation.

Phase 1: EWS attempts to improve the quality of online education by introducing innovative mechanisms to motivate and monitor learners progressively according to an acceptable performance threshold. This threshold may be set by the course coordinator and may vary from activity to activity and from course to course.

Phase 2: EWS involves the deployment of Machine Learning Techniques (MLT) to intelligently examine the interaction and activity reports in Moodle to diagnose each student's academic performance. The MLT, precisely Artificial Neural Network (ANN), will be trained on past data to derive a predictive map that permits rating student's ability to pass a course at various points during the semester.

The alert system started its design work in year 2011 and has to date implemented Phase 1 on Moodle as a block plugin. It is designed to assist the students in the following: manages course time, informs on the upcoming activities, highlights the popular activities, shows the progress of the activities and resources, shows course engagement on Moodle with respect to the class average, identifies the areas which needs intervention and flags behavioural areas of disengagements. The system also provides an opportunity to the course coordinators to look into the progress of all students and send direct alerts to under-performing students. The report generated can also be useful to other stakeholders such as the sponsors

3. IMPLEMENTATION

The EWS was implemented in a total of 22 first year and online courses of Faculty of Science, Technology and Environment (FSTE) in semester 1, 2013. These courses were identified according to the amount of online content each course had available for its students. There were courses chosen with high, low and average number of online content. This was to see how effective EWS was in courses with different percentage of online presence. The EWS team conducted several workshops on EWS for both students and staff. The student sessions covered how to use the system and how each feature works, while the staff sessions were about setting up the system and features with its usage and benefits. The students and staff were also provided with user manuals.

There were several surveys carried out during the implementation stage and after the course completion to get the feedback on the effectiveness of the system and which other features could be added to the system.

4. FEEDBACK AND EVALUATION

Firstly, for students, many questions were asked to capture how they used the system, was it benefiting them and if it improved their performances. The analyses show that the use of EWS in courses improve students participation in the course in various ways.

Figure 1 shows how often the students visited the EWS for a generic course (UU100 which is compulsory university wide). The survey was done at the beginning of implementation and in week. The results show that the percentage increased interms of the number of student visting EWS at two different points of the semester.

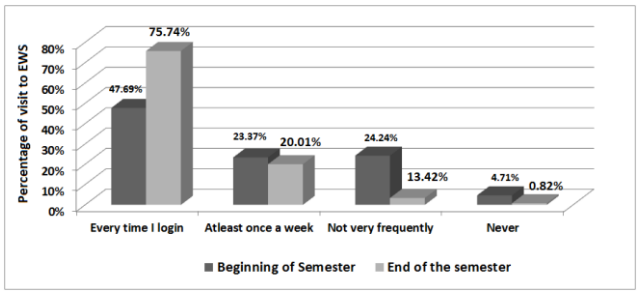

FIGURE 1: Graph is showing how the often the students visited the EWS at the beginning of semster and after mid-semester.

The staff had mixed views about the system. Generally, they believed that this can be beneficial to students and also to them as they will be able to identify at-risk students early and alert them. There were also request to add more reporting features.

Since EWS is implemented on Moodle, the Moodle admin team played an important part in the implementation as well. The feedback indicates that as the system progresses through the semester, the system introduces overheads on Moodle server as the processing is done in real-time. This issue is currently being addressed.

Figure 2 shows the completion rate of critical activities for semester 1, 2011 and Semester 1, 2012 for the generic course (UU100). As the graph shows the completion rate increased in all the course modules and also the overall completion.

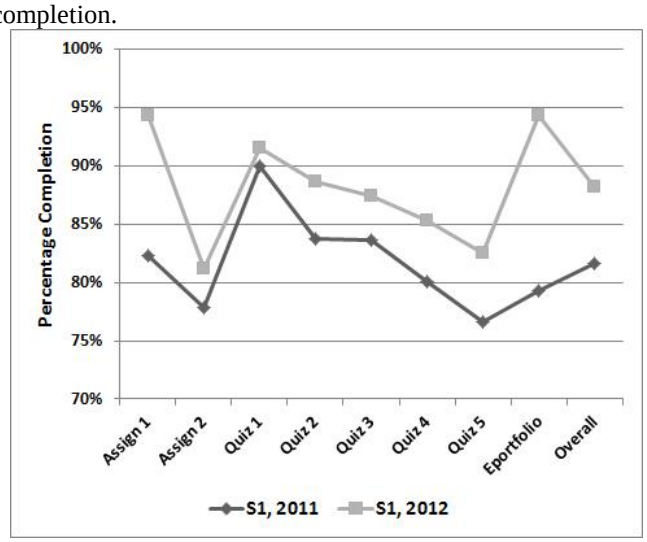

FIGURE 2: Completion rate of critical activities for semester 1, 2011 and Semester 1, 2012

5. DISCUSSION

Using the feedback of EWS from different stakeholders, the EWS team is now challenged to design a better and more efficient version. The latest version would look into the enhancement of features, adding more features as requested and to improve the overall architecture of data processing. The increase of data and its processes in real time made the processes slow in Moodle towards the end of semester and therefore it became a necessity to have the data processed in another system and then synchronized with the Moodle database. The other enhancements were done with the reporting features for staff which would give them more opportunity to easily identify at-risk students on different metrics and a better provison of early intervention.

6. CONCLUSION

The paper has presented the pilot result of the implementation of EWS in Semester 1, 2013. The system is being piloted in different courses each semester and the bugs are fixed according to the feedback from different users and Moodle team. The Version 2 of the EWS is aimed to be implemented in Semester 1, 2014 with all its enhancements and highlights across University wide. After implementation of Version 2, the team will start working on the Phase 2 of the system, which will be a complete system having Artificial Intelligent for prediction at-risk students as early as in week 3 or 4 and hence be rightfully classified as a prediction system as well as a progression model.

7. REFERENCE

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