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**Enhance UCSC Virtual Campus by Developing New Modules**

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# Table of Contents

Contents

[Table of Contents 2](#_Toc393429198)

[List of Figures 3](#_Toc393429199)

[List of Abbreviations 4](#_Toc393429200)

[Chapter 1: Introduction 5](#_Toc393429201)

[Student Course Registration 6](#_Toc393429202)

[Student result publication 6](#_Toc393429203)

[Twitter integration for broadcast updated among students 7](#_Toc393429204)

[Virtual class room based on Google Hangouts 7](#_Toc393429205)

[Chapter 2: Background 8](#_Toc393429206)

[Chapter 3: Analysis and Design 9](#_Toc393429207)

[Analysis 9](#_Toc393429208)

[Design 10](#_Toc393429209)

[Chapter 4: Progress to Date and Project Plan 12](#_Toc393429211)

[References 12](#_Toc393429212)

# List of Figures

Figure 3.1: Structure of Student course selection module

Figure 4.1: Work breakdown structure

# List of Abbreviations

UCSC – University of Colombo School of Computing

VLE – Virtual Learning Environment

# Chapter 1: Introduction

“Learning conducted via electronic media, typically on the Internet” this is how the oxford dictionary define e-learning. Virtual Learning also refers to the same.

E-learning is the use of electronic media, educational technology and information and communication technologies (ICT) in education. E-learning includes numerous types of media that deliver text, audio, images, animation, and streaming video, and includes technology applications and processes such as audio or video tape, satellite TV, CD-ROM, and computer-based learning, as well as local intranet/extranet and web-based learning. E-learning in learning and education refers to the use of modern technologies, such as computers, digital technology, networked digital devices (e.g., the Internet) and associated software and courseware.

The virtual learning environment that is deployed in UCSC is based on Moodle [[1](#Moo14)] open source project.

Moodle has several features considered typical of an e-learning platform, in addition to some original innovations like its filtering system. Moodle is a learning management system (LMS). Moodle can be used in many types of environments such as in education, training and development, and business settings.

Some typical features of Moodle are:

* Assignment submission
* Discussion forum
* Files download
* Grading
* Moodle instant messages
* Online calendar
* Online news and announcement (College and course level)
* Online quiz
* Wiki

Moodle is a highly customizable and extensible system that allow for developers to add new features and customize existing features using plugins and also look and feel can be customized using themes. Moodle is based on PHP programming language [[2](#Off14)] backing with MySQL database. [[3](#Off141)]

Current UCSC VLE consists of several good features that help to involve students effectively for courses, assess their involvement of the course and improve interactivity with the teacher and also the colleagues.

When using the VLE it can be identified that there are some places that need to be improved and also a few nice to have features.

### Student Course Registration

Student course registration process is one place that needs to be improved. In the beginning of each semester students need to register for the courses that they need to follow in that semester. There are compulsory courses as well as optional courses. Two parts were identified in course selection process.

One is course registration for administrative purposes such as prepare student lists for courses, class allocations, examination purposes. Other one is enrol for courses in virtual learning environment.

In current system, course registration for administrative purposes is done in paper based manual way. Student need to fill a form with relevant courses and submit it to the academic office. According to the students’ preferences, enrol for courses in virtual learning environment are done by the system administrator.

Course selection module is developed to automate these two processes. The course selection module consists of two levels of access such that One for system administrator and other one for students.

With new module, system administrator can put a link in VLE for students to access course registration form when course registration available, define a deadline for course registration, define available courses for each semester, define compulsory courses and optional course.

Student can access course registration form through the link that added when the course registration enabled by system administrator. Student can be seen available courses for them and compulsory courses already selected by default and can’t unselect. Optional courses can be selected according to student preference. Total number of credits that a student is going to register is also displayed to student. Student can select courses that need to follow and then submit the form. Also course selection can be modified before the deadline.

When the deadline reached, registration form submissions are processed and course selection module is ready for enrol students to courses as they selected through the course selection form. Then module notify to the system administrator to trigger the user enrolment process. Also system administrator can generate student enrolment reports for administrative purposes.

### Student result publication

In current VLE student result publication done in very poor way such that result sheet in PDF format for each course is uploaded and put a link to access it. Student need to download a PDF file for each course and find their result. There is no way to view all subject results in one place. When think about privacy also this is not a god way to publish results.

So result publication module is developed to enhance result publication in VLE. In this module also there are two access levels, one for teachers to publish the results and other one for students to view their results.

For each course, teacher has access to result publication form. Student list is automatically generated according to the student enrolment and then teacher can add result for each student. Also it allows to upload result sheet in excel format for ease of use. Result publication module process the excel file and store result of each student.

Student can access the result sheet through their profile to view result sheet. Result sheet consist with list of courses that student registered along with result. Total number of credits and GPA value are calculated and displayed

### Twitter integration for broadcast updates among students

Current VLE uses email for send notifications and updates to students. It notifies user only if user subscribe to particular thread.

Its better if student receive an email when teacher add new note or assignment to a course that student already enrolled. But current system doesn’t do it.

Other thing is for each update system need to send a bulk of email for a group of students. It’s pretty much costly because for each update need to send a mail per user.

Twitter [[4](#Twi14)] is very good for broadcast messages among followers. Twitter integration module is designed to feed updates to a twitter account automatically. Students are facilitated to follow that twitter account and can be get updated.

### Virtual class room based on Google Hangouts

Collaborative learning is being further expanded by the integration of video into virtual classrooms. As a result of the growth in online and virtual education, video conferencing has become a key enabler for providing a richer, more flexible, as well as a cost-efficient means to online learning.

Students around the world are using video conferencing to take classes remotely, connect with other students globally, and learn from teachers and resources virtually. Advances in high-speed Internet services, easy-to-use software, emergence of cloud-based services, and changing perceptions toward video are paving the way for integration of video conferencing into the online classroom experience.

Educators and schools are embracing video conferencing because it improves access to educational resources and experts at lower costs, allowing access to instructors regardless of their physical location.

Google Hangouts [[5](#Goo14)] is becoming so popular for browser based video conferencing. It can be used to create a feature rich virtual classroom without worrying underlying communication protocols, connection handling and session management. Other thing is its free service provided by Google. So virtual classroom features is implemented for USCS VLE using Google hangouts.

# Chapter 2: Background

Since 1999 Moodle has developed and improved with features and functionalities by the cooperation of various open source developers. Huge set of modules and themes makes Moodle, a feature rich, interactive virtual learning environment.

Moodle has clearly defined coding guidelines [[6](#Moo141)], new module development documentation [[7](#Gui14)] and API documentation [[8](#Moo142)] . Those documentations make developers life easier and also lead to make more and more new modules that enabled various features.

There can be found a large collection of plugins for moodle from moodle plugins repository [[9](#Moo143)]. Those plugins are nicely categorized. When check on “Enrolment” category [[10](#Moo144)] there are plenty of plugins available for handling user enrolment with different approaches. Some of them are,

* Signup plugin (enrol\_signup) [[11](#Moo145)] : enrol users in to desired courses when they sign up to Moodle.
* enrol\_attributes plugin [[12](#Enr14)] : allows users to be enrolled according to any value stored in their user profile.
* enrol\_apply plugin [[13](#Cou14)] : add an approval step into the course enrolment process.
* ZiLink - Cohort Enrolment plugin [[14](#ZiL14)] : enhance virtual learning environment by integrating data from the institute Management Information System (MIS).

Among these enrolment plugins couldn’t found any plugin that can be used to automate the current manual user enrolment process of UCSC. So new module is developed with required features.

There are lot of moodle plugins available that can be used for twitter integration. Most of them are designed to display a twitter feeds in VLE. Some plugins found with a capability of feeding updates to twitter account.

I analysed several twitter integration modules that are developed for moodle or some other systems to identify the best way which we can utilize full power of twitter. Most of twitter integration applications use single twitter account and they use hash tags to differentiate various topics. So followers can filter tweets from hash tags.

So I used that approach to implement twitter integration plugin for UCSC VLE.

When search for virtual classroom plugins WizIQ [[15](#Wiz14)] was found. WizIQ [[15](#Wiz14)] is a commercial virtual classroom solution. It has Moodle plugin to integrate with existing Moodle VLE to create a virtual classroom.

WizIQ system is consist of single sign-on, schedule and manage classes, upload content, and view recordings from within Moodle Virtual Classroom, track class attendance and gets class recordings.

Also they hosted the virtual classroom in their own cloud.

It has many cool features but need to pay per teacher to obtain this service. Also it support only for 6 simultaneous video channels.

BigBlueButton [[16](#big14)] is an open source web conferencing system for on-line learning. BigBlueButton supports real-time sharing of slides (PDF and any document readable by OpenOffice), webcams, whiteboard, chat, voice over IP, and desktop. It can record and playback all content shared in a session.

BigBlueButton consist of Ubuntu Linux based server and clients to interact with server. Also it has API to integrate other systems with BigBlueButton server. So to make use of this we have to setup and maintain BigBlueButton server also. It’s an unnecessary complexity for UCSC virtual learning system.

Google Hangouts is an instant messaging and video chat platform developed by Google. It replaces three messaging products that Google had implemented concurrently within its services, including Google Talk, Google+ Messenger (formerly: Huddle), and Hangouts, a video chat system present within Google+. Google has also stated that Hangouts is designed to be "the future" of its telephony product, Google Voice, and integrated some of the capabilities of Google Voice into Hangouts

Google hangouts provide video conferencing, file sharing and also video recording facilities. Recorded videos can be also broadcasted using ‘Hangouts on Air’

Since Google hangouts is free service and also it’s well established and stable system we don’t need to worry about extra cost or stability of the virtual classroom system. So it’s decided to use Google Hangouts to create a virtual classroom for UCSC virtual campus.

# Chapter 3: Analysis and Design

### Analysis

Through this project, four new Moodle modules will be introduced to the UCSC VLE. Requirements that will be fulfilled by each module displayed below.

#### Student Course Selection Module

Following requirements need to be fulfilled by Course selection module.

1. Restrict access for loged in users only. Only students and admin users can access the module.
2. Admin user can be able to put a link in VLE for students to access the module.
3. Admin user can be able to define available courses for each year and each course defines whether it is compulsory course or optional one.
4. Admin user can be able to set a deadline for course selection.
5. Students can be able to view a link to access course registration module when admin enable the course registration.
6. Student can be able to access course registration module through the link added by admin user.
7. Student should be able to view available courses and compulsory courses should be selected by default and couldn’t be able to unselect compulsory courses.
8. Student should be able to select and unselect optional courses.
9. Total number of credits that selected by student should be displayed.
10. Student can be able to submit the course registration from.
11. Student preferences should be stored in database.
12. Student can be able to modify the preferences before the deadline.
13. When the deadline reached, link should be removed.
14. Course selections should process when reach the deadline and student should be enrolled to relevant courses.
15. Admin should be able to generate student course registration report.

#### Student Result Publication Module

Following requirements need to be fulfilled by result publication module.

1. Teacher in charge should be able to access result publication module for the course.
2. Teacher should be able to view registered student list for the course.
3. Teacher should be able to add result for each student that obtained for the course.
4. Results should be stored in database.
5. Student should be able to access their result sheet though the user profile.
6. List of courses that student registered, grade for each course, should be display to student.
7. GPA value should be calculated and shown to student.

#### Twitter Integration Module

Through this module system should be able to feed notifications to twitter. Also module should be able to show an option for a system administrator to enable/ disable notification feed.

Through my analysis two options were identified.

First option is create a twitter account for each course and allow students to follow relevant twitter accounts. Other options is create single twitter account for each students group (Ex. MCS/ MIT/ MIS) and differentiate feeds for each course or topic using hash tags.

#### Virtual Classroom module

Teacher can be able to create a class, schedule a time and send invitation to students. At the schedule time notification will be sent to the teacher and students. Teacher can be started the lecture at the scheduled time and students can be joined with the lecture.

### Design

#### Student Course Selection Module

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Figure 3.1: Structure of Student course selection module

Figure 3.1 shows the overall structure of course selection module. It contains three interfaces for course configuration for admin, course selection for students and reports for admin. Course selection module store data received from course configuration form and course selection form. Cron task [[17](#Cro14)] executes on dead line and enroll students to relevant courses.

#### Student Result Publication Module

Result publication module designed with two components. One is result publication by teacher or an admin. Other one is result sheet for student.

In result publication component, teacher can be obtained a form with registered students for the course. Teacher need to fill the form with student results and then need to submit it.

Result sheet can be accessed by a student through the user profile. Result sheet component grab results from dB for particular student and display results along with total number of credits earned and overall GPA.

#### Twitter Integration Module

A twitter account needs to be created for each batch (Ex: 2012 MCS batch). To obtain benefits of this module each student should have a twitter account and need to follow the twitter account relevant to their batch. Moodle admin can configure twitter accounts for each batch. .

The design of this module is not finalized. According to the current design, for each course a twitter account also created. Every update of a course feed to its twitter account. Student need to configure a twitter account to their user account to obtain the benefit of this module.

When user enroll for a course user automatically follow the twitter account of particular course. User can be activate/ deactivate notification receiving later.

Notification feeding component of the twitter integration module feed updates of a course to its twitter account. Then followers of the course will receive the updates.

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