ICT in Pakistani Academia: Potential for Open Source Learning Management Systems

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Dean, DHA Suffa University, Karachi

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Institute of Business Administration, Karachi
14-15 December 2013

About Engr. Dr. Athar Mahboob, TI

- Professor, Dean & Director IT, DHA Suffa University, Karachi 2012-2013
- PhD (Information Security & Cryptology), NUST, Pakistan, 2005
- MS & BS (Electrical Engineering), Florida State University, USA, 1995/1992
- Awarded Tamgha-e-Imtiaz (TI) by the President, Islamic Republic of Pakistan on account of valuable contributions to Engineering and Science & Technology Education in the country, 2012
- 25+ years of Teaching, Research, Industrial and Management Experience, 1988-2013
- President Ibn Khaldun Systems: successfully managed more than 50 industrial projects 2005-2012
- Former Head of Computer Science Department, PNEC-NUST, Karachi, 2011-2012
- Former Head of Computer Engineering Department, Sir Syed University of Engineering & Technology (SSUET), Karachi, 1996-2001
- Former Head of Linux Task Force for promotion of Linux and open source software, Ministry of Science & Technology (MoST), Government of Pakistan, 2001-2002
- HEC Approved PhD Supervisor
- Published a book on Cyber Security which is being used as a Textbook in advance universities of USA and Europe, 2011
- Invented: Bitwizard Secure Communication Device for VoIP Phones
- Trained large number of students and professionals in Linux, Cryptography, Information Security and Internet Technologies, 1996-2013
- Published more than 30 research papers in referred international journals and international conferences, 1998-2013

Drivers for a University ICT Strategy

- We are living in the “Knowledge Age”
- A crowded higher education field – around 200 public + private universities in Pakistan
- ICT can be the “game-changer”
- Higher education has a symbiotic relationship with ICT
- ICT is changing learning patterns – universities have to be in harmony with the changing scenario
- ICT with Open Source can allow us to bridge the digital-divide
- We have not only to catch-up but rather to leap-frog ahead of the competition – ICT can allow us to do that
- Modern university is an “online”, “automated”, “paper-less” university

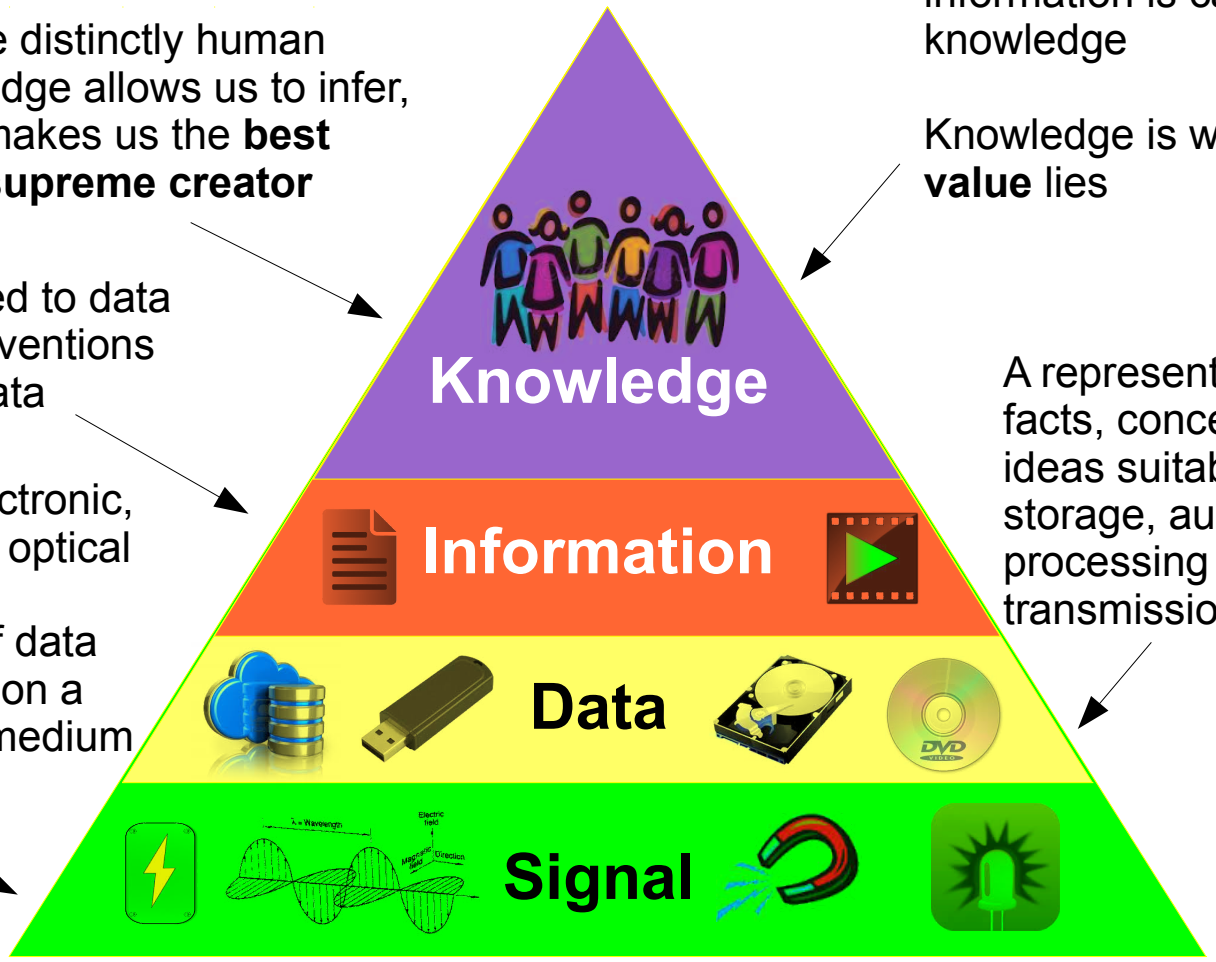
The Information Pyramid

Knowledge resides in **individuals**

Knowledge is the distinctly human attribute. Knowledge allows us to infer, create, judge – makes us the **best creation** of the **supreme creator**

Meaning assigned to data by means of conventions applied to that data

An electrical, electronic, electromagnetic, optical or mechanical representation of data which can travel on a communication medium or be stored



The certainty of some information is called knowledge

Knowledge is where the **value** lies

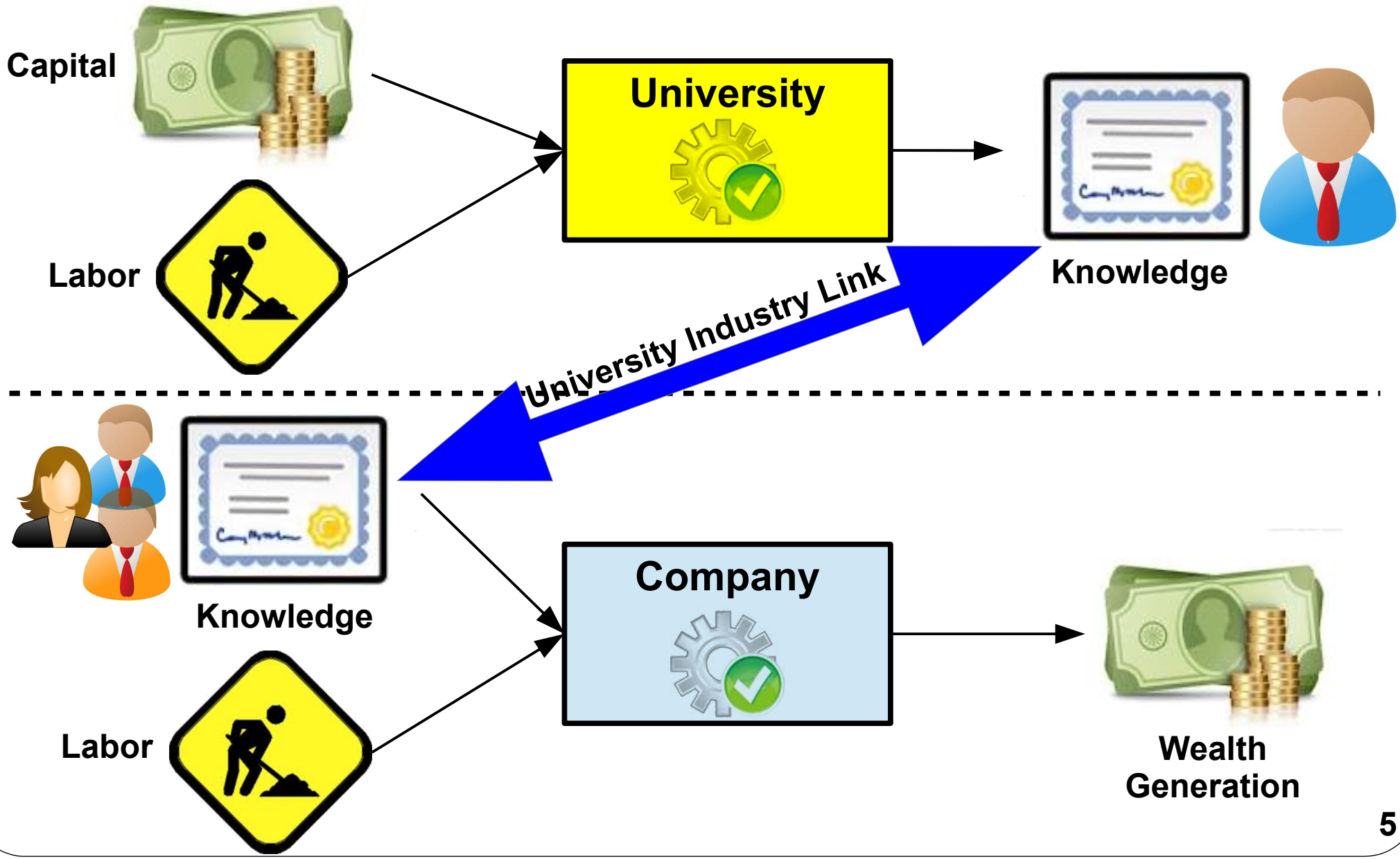
A representation of facts, concepts and ideas suitable for storage, automatic processing and transmission

University Finished Goods

Raw Materials for University

Why is this important for us and part of this discussion?

Knowledge, Labor and Capital – the Eco System

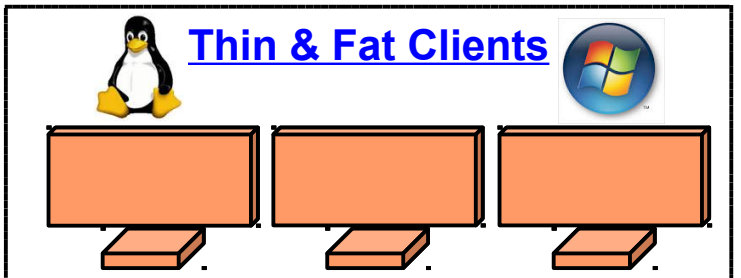


Typical University Private Cloud

High Speed Campus Network

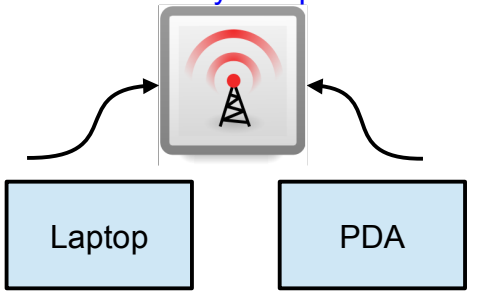
800+ network nodes in 8 segments covering all offices and Labs at the University connecting to a High Performance Network Core

Thin & Fat Clients



Wireless Network

Infrastructure Access Points and smaller access points provide wireless networking coverage to entire university campus.



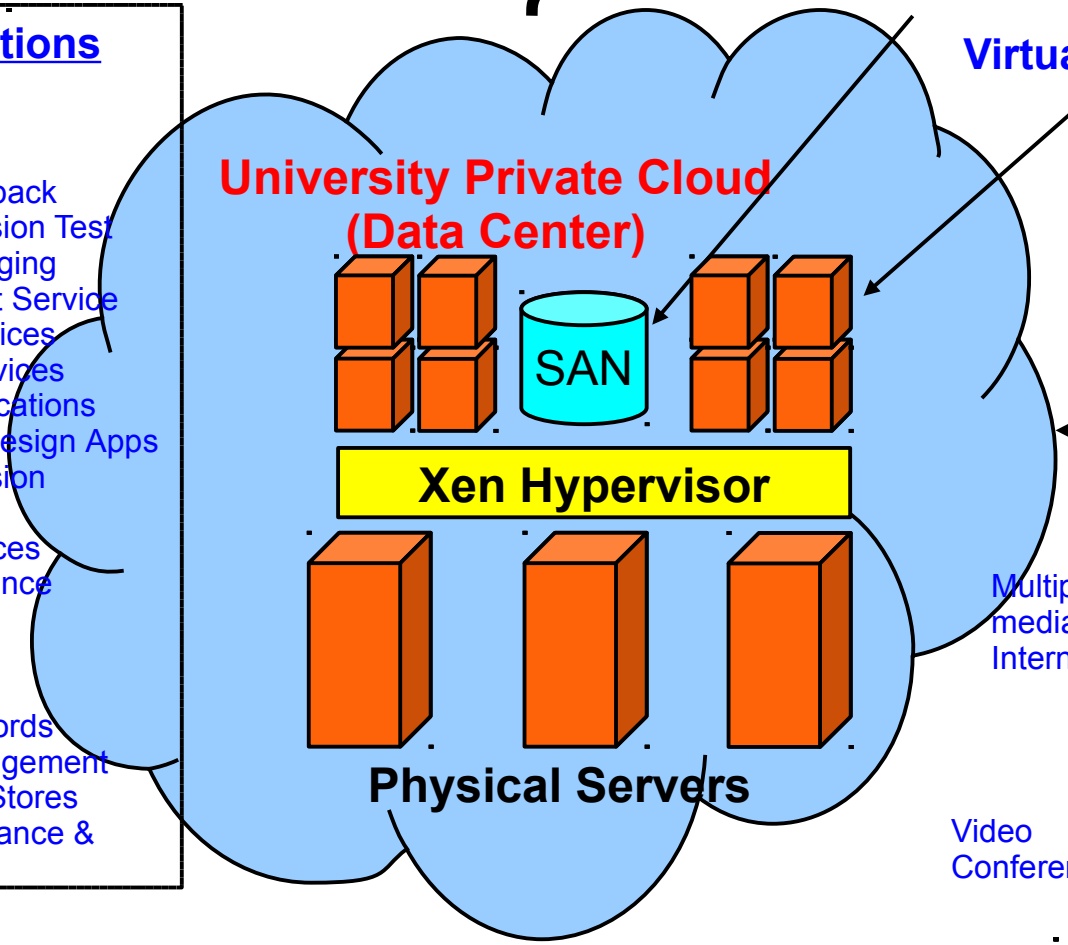
University Data

ERP, LMS, Email

Virtual Servers

IT Applications

- LMS
- Email
- Timetable
- Student Feedback
- Online Admission Test
- Instant Messaging
- Network Mgmt Service
- Directory Services
- Terminals Services
- Desktop Applications
- Engineering Design Apps
- Online Admission Application
- Storage Services
- Video Conference Service
- ERP
  - Accounting
  - Student Records
  - Library Management
  - Inventory & Stores
  - Time, Attendance & Leave Mgmt

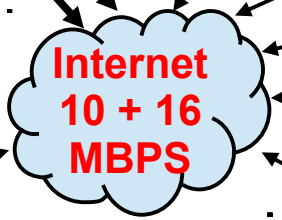


University Firewall

Virtual Private Network – VPN

VPN access to university Network for employees and business partners. Through VPN all enabled IT services can be accessed securely from any remote location

Multiple redundant media high-speed Internet Links



Email

Web

Digital Library

Social Media

Video Conferencing

The Modern University System

- **Semester System** (based on National and International Standards) – Modular Approach
- **Rigorous**: Continuous Assessment
- Each Course is a **COMMUNITY** lead by the **TEACHER**
  - LMS helps the community collaborate and communicate
  - LMS helps in maintaining transparency w.r.t teacher and students
  - LMS augments/empowers the teacher – does not replace him/her
- Feedback helps to stabilize the system and Feedback improves quality

Students' Services with IT

- Register for courses
- Access resources available all over the world to enhance learning
- Get course materials, assignments, tests and grades
- Interact with teaching staff and fellow students through forums
- Get financial information – dues
- Get News about activities such as seminars, events, the department, university
- Can use his/her PDA, Laptop anywhere on campus to get access to services
- Can use all services from home or any other location through secure VPN
- Can communicate and collaborate – today learning is collaborative and social

Faculty's Services with IT

- Can communicate with students beyond the classroom
- Can document their efforts through availability of course materials online for everyone to see
- Can communicate and collaborate with their colleagues throughout the global academia
- Can access research information repositories like HEC Digital Library
- Can use technology and tools to enhance their teaching effectiveness and satisfaction
- Manage research and projects using world-class project management system

Linux and Open Source & Some Misconceptions

- Open source is a viable business model - business model is based on services alone:
  - Implementation
  - Customizations
  - Training
  - Documentation
  - Support
- A fair and consumer friendly business model for software because:
  - Software is heavily reuse oriented and incrementally developed
  - Software is infinitely replicable
- Open source is free software !
  - Software is free, *people are not* !
  - Free as in “freedom” not necessarily as in “free beer”
- Open source is a better software engineering methodology

  “Given enough eye-balls, all bugs are shallow” - Linus' Law

Moodle Learning Management System

- Open Source Course Management System (CMS), also known as a Learning Management System (LMS) or a Virtual Learning Environment (VLE).
- PHP (LAMP/WAMP) Web Application - Ubiquitous
- Rock Solid
- Modular, Extensible
- Has beaten many a commercial LMS
- Very large community

Moodle Quick Start: Use bitnami Moodle Stack

Moodle

BitNami Moodle provides a one-click install solution for Moodle. Download installers and virtual machines or run your own Moodle server in the cloud.

Moodle is a Course Management System that is designed using sound pedagogical principles to help educators create effective online learning communities. It can scale from one computer to a 50,000-student university and is used in over 175 countries.

Homepage: moodle.org

Install Moodle on your own Laptop or Server.
View all operating system and download options

Run a Moodle virtual appliance in your virtual infrastructure.
View all operating system and download options

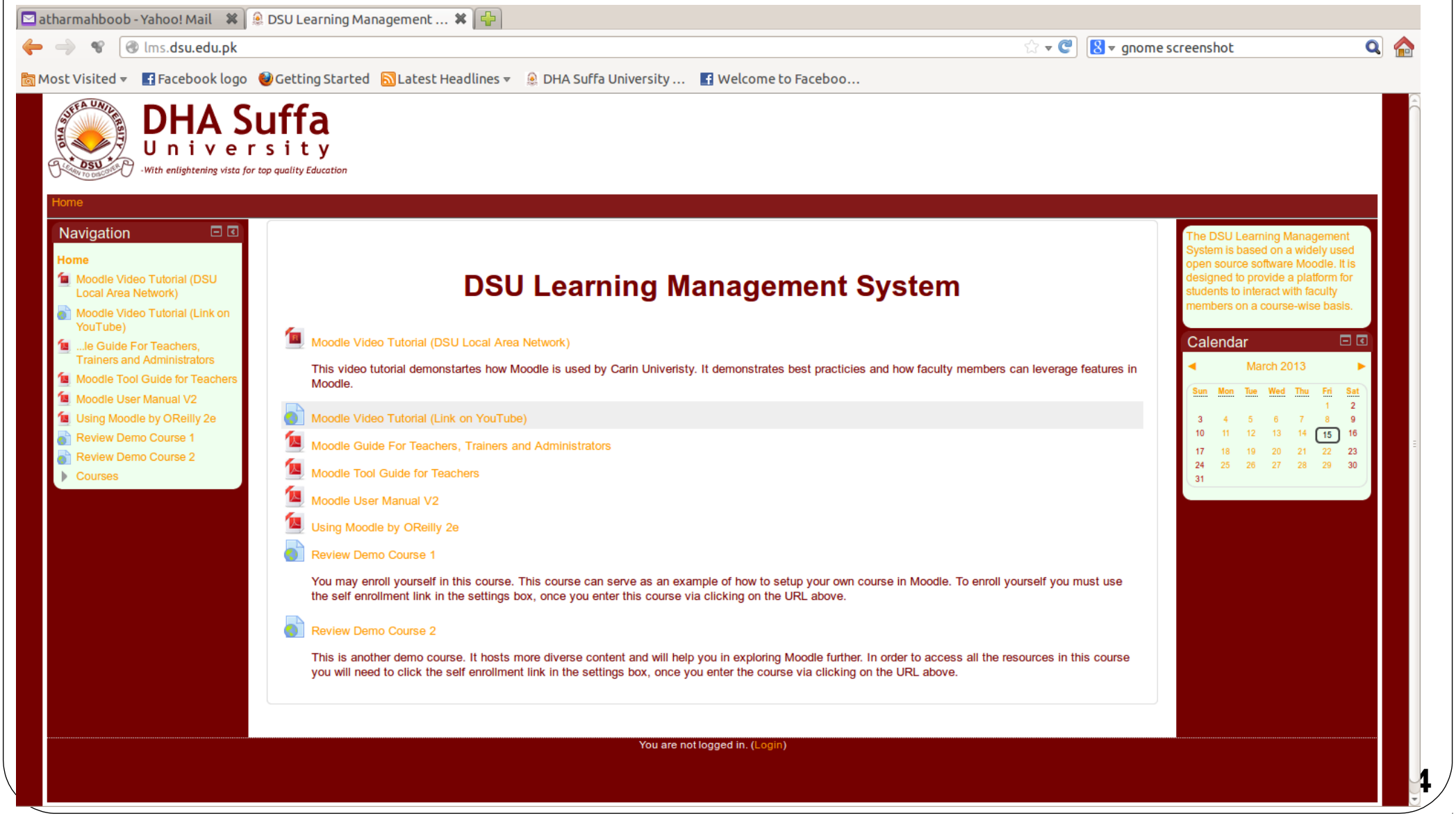
Run your own Moodle server in the cloud with our hosting platform or using a pre-built image for Amazon, Azure and other providers.

http://bitnami.org/stack/moodle

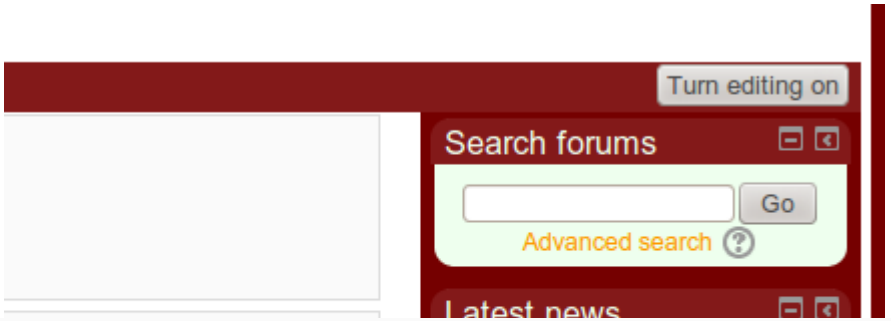
Moodle Out of the Box

- Course Event Calendar
- Distribution of Lecture Notes and Reading Material
- Grade Book to maintain student grades for assignments, quizzes, hourly exams, projects, etc.
- Tests and Quizzes
- Homework Assignment and Collection
- Student Attendance Recording
- Feedback Module to help the teacher receive evaluation of his/her teaching
- Course Discussion Forums
- Course Wiki

Moodle with University Theme



Turn Editing On ...



Magic starts when the teacher “Turns Editing On”

Add an activity or resource

31 December - 6 January

dsu_virtual_conference_room

Test Quiz 1

Add an activity or resource

7 January - 13 January

First Programming Assignment

This is the First Programming Assignment

testing mathjax

$3 + 3 \times (4)^5$

stack_quiz

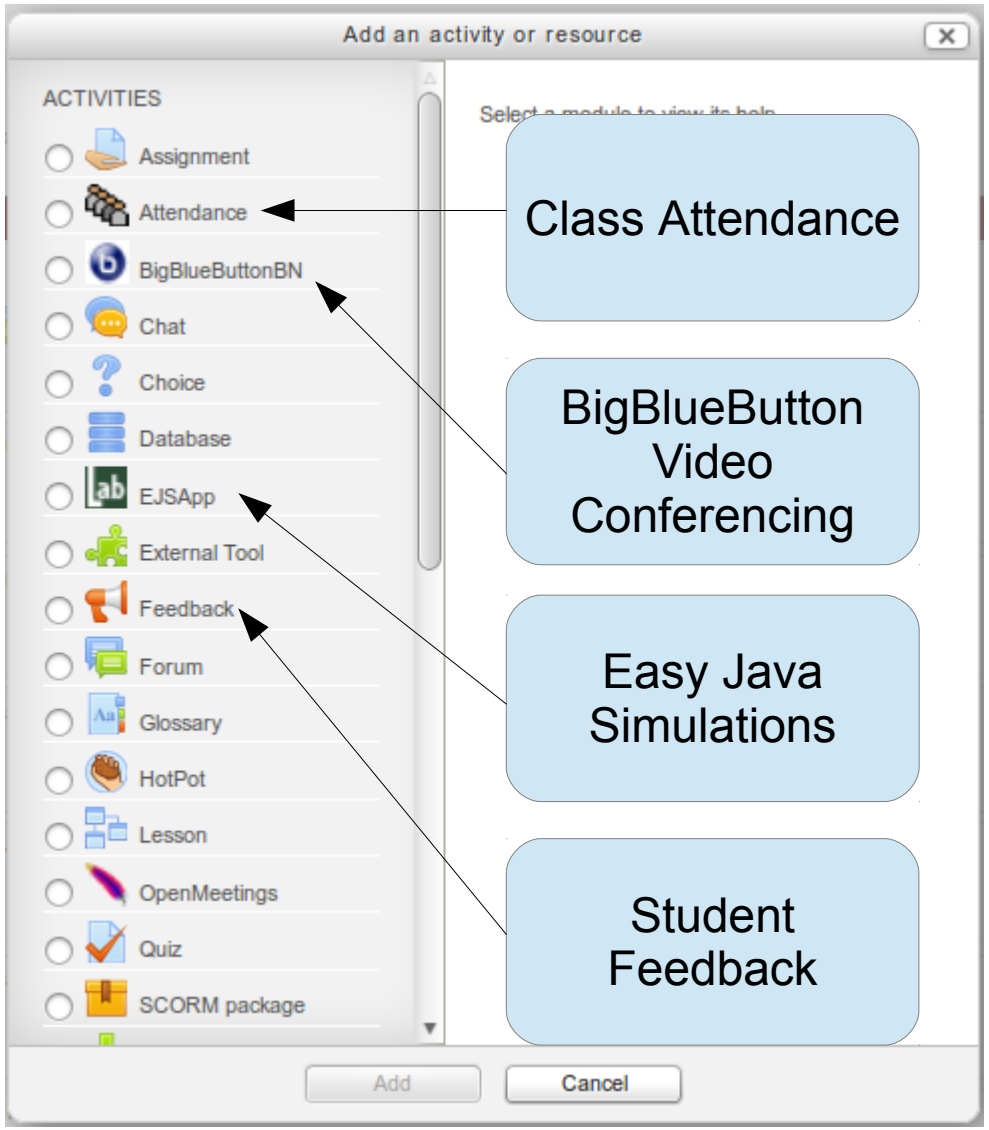
lab1

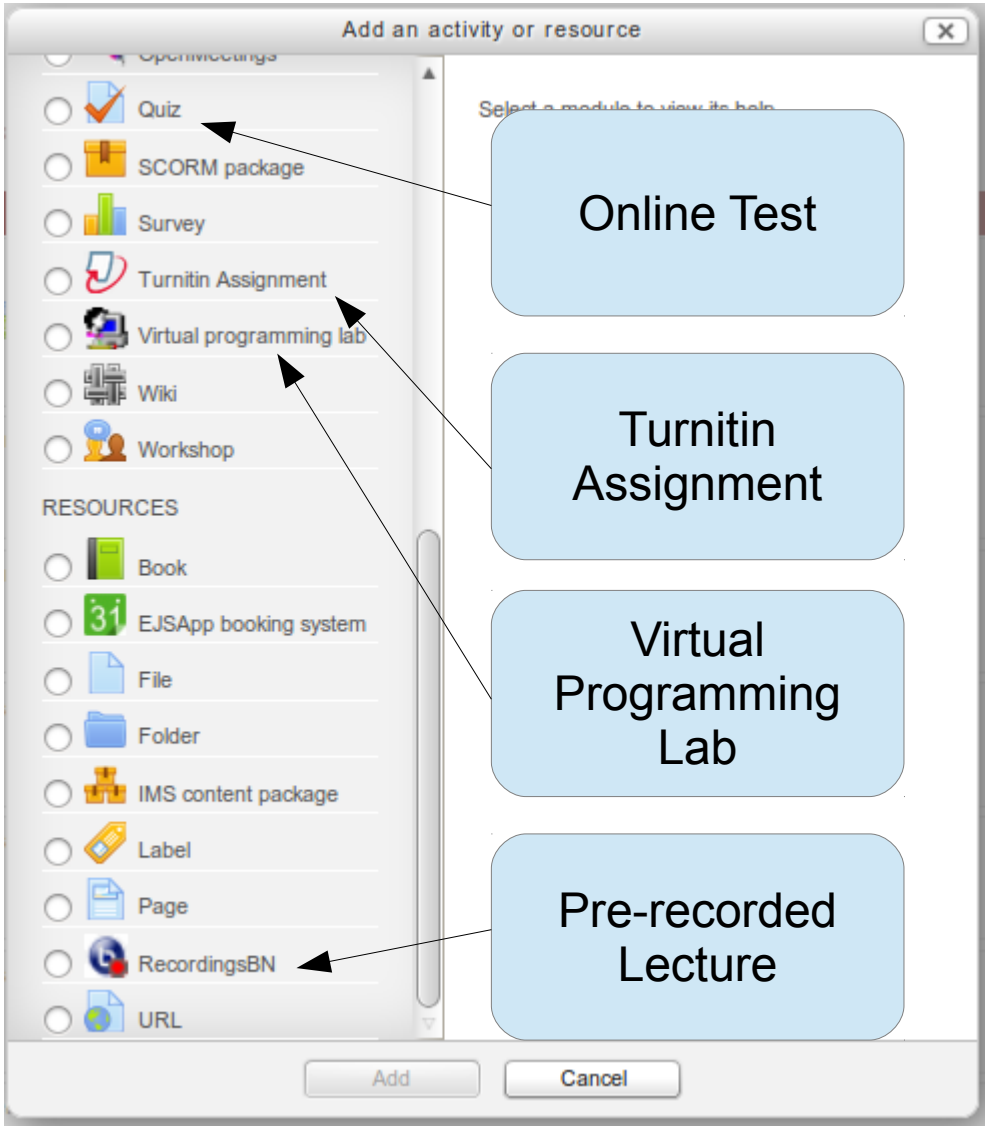
Add an activity or resource

Additional Moodle Components – Create Impact

- **EJS**: Easy Java Simulations
- **VPL**: Virtual Programming Lab
- **BBB**: Big Blue Button
- **STACK**: Computer Algebra System
- **Turnitin** integration

Moodle Activities & Resources





What is EJS?

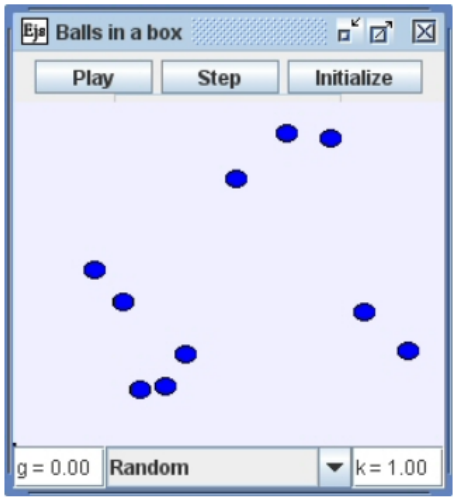
Demos/Examples
Credits
Links
Webcasts/Video
EJS Users' Group
Installation
Download
EJS Workspaces
Running EJS
Conditions of Use
Documentation
EJS Console
EJS Interface
Description Panel
Model Panel
View Panel
Deployment
Digital Libraries
Elements Reference
Advanced Topics
Moodle Support
EJS Modelling Forum

What is EJS?

Easy Java Simulations is a software tool (java code generator) designed for the creation of discrete computer simulations.

A discrete computer simulation, or simply a computer simulation, is a computer program that tries to reproduce, for pedagogical or scientific purposes, a natural phenomenon through the visualization of the different states that it can have. Each of these states is described by a set of variables that change in time due to the iteration of a given algorithm.

All this means that EJS is a program that helps you create other programs; more precisely, to create scientific simulations.



A simulation of balls colliding in a box.

There exist many programs that help create other programs. What makes EJS different from most other products is that EJS is not designed to make life easier for professional programmers, but has been conceived by science teachers, for science teachers and students. That is, for people who are more interested in the content of the simulation, the simulated phenomenon itself, and much less in the technical aspects needed to build the simulation.

Easy Java Simulations is a modeling and authoring tool expressly devoted to this task. It has been designed to let its user work at a high conceptual level, using a set of simplified tools, and concentrating most of his/her time on the scientific aspects of our simulation, asking the computer to automatically perform all the other necessary but easily automated tasks.

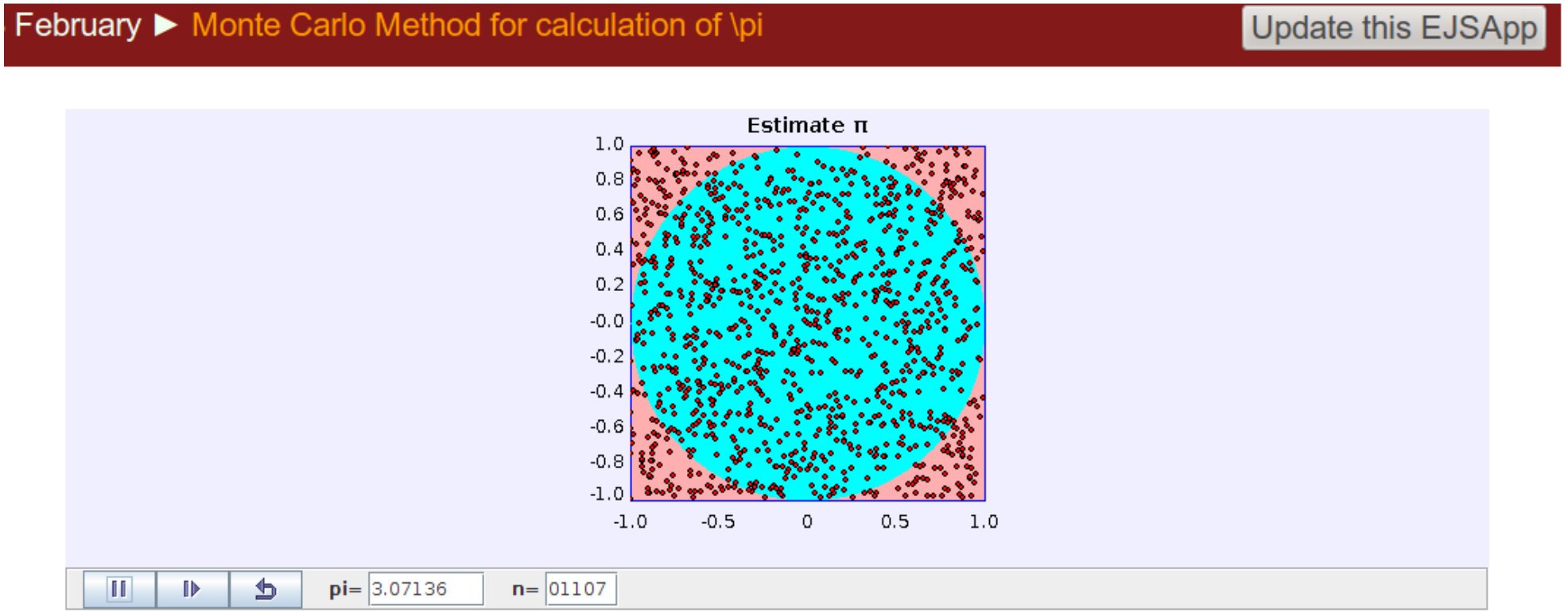
Nevertheless, the final result, which is automatically generated by EJS from your description, can, in terms of efficiency and sophistication, be taken as the creation of a professional programmer.

In particular, EJS creates Java applications that are platform independent, or applets that can be visualized using any Web browser (and therefore distributed through the Internet), which read data across the net, and which can be controlled using scripts from within web pages.

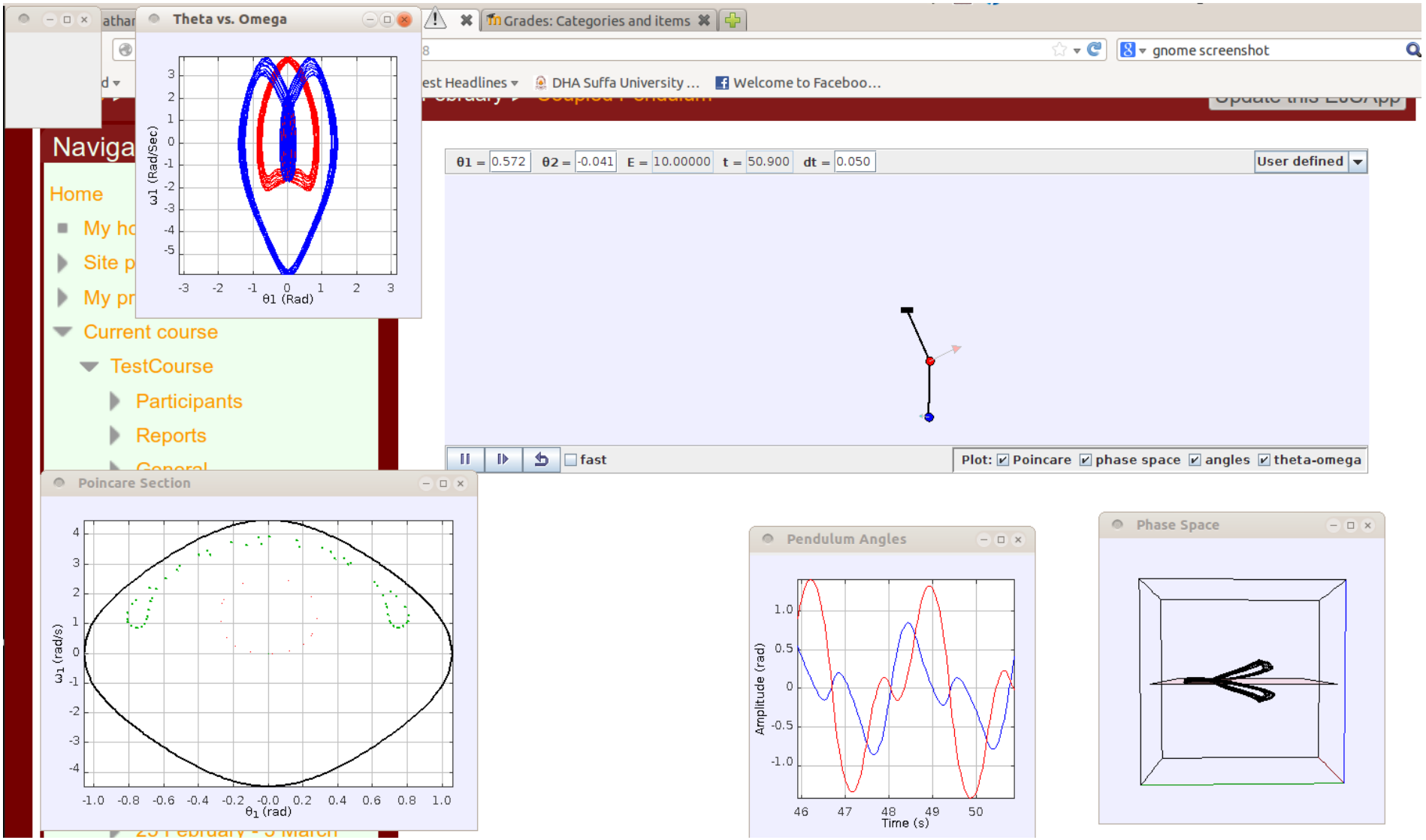
Because there is an educational value in the process of creating a simulation, EJS can also be used as a pedagogical tool itself. With it, teachers can ask their students to create a simulation by themselves, perhaps by following some guidelines which provided by the instructor. Used in this way, EJS can help students make their conceptualizations explicit. Used in groups, through social constructionism improve the students abilities to discuss and communicate about science , learning to be scientist instead of learning about it.

http://www.um.es/fem/EjsWiki/Main/WhatIsEJS?

Easy Java Simulations
Example - 1



Easy Java Simulations
Example - 2



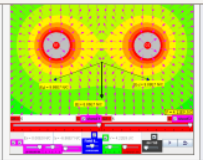
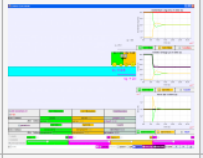
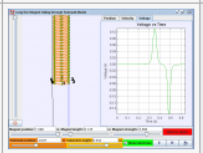
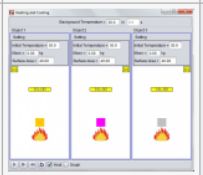
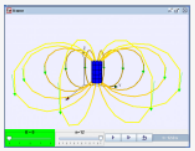
Collaborative Community of EJS

(3 unread) - atharmahboob ... | Collaborative Community o... | Grades: Categories and items

www.phy.ntnu.edu.tw/ntnujava/index.php?board=28.0

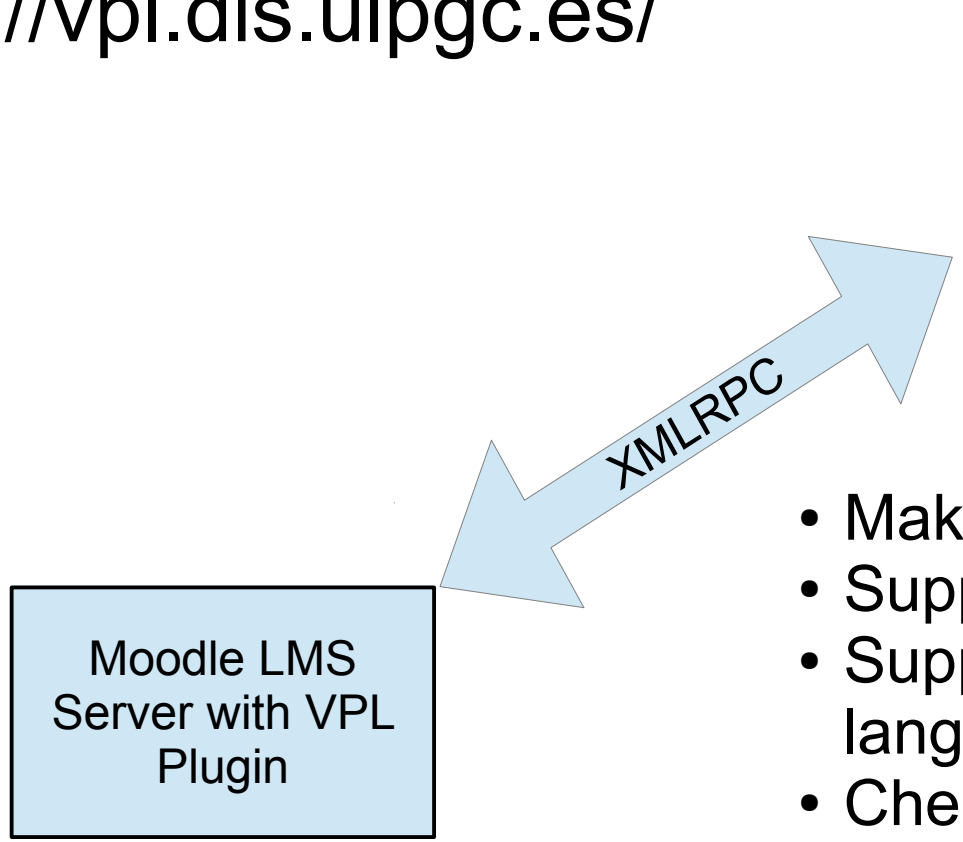
gnome screenshot

Most Visited | Facebook logo | Getting Started | Latest Headlines | DHA Suffa University ... | Welcome to Faceboo...

	Ejs Open Source 2 Charge Model with Field Vector, Field Lines, Potential Visual	lookang	11	4089	February 20, 2013, 01:02:59 pm by lookang
	Ejs open source java applet 1D collision carts with realistic collision	lookang	4	2098	February 19, 2013, 01:05:56 pm by lookang
	Speed for Secondary Maths	engrg1	0	263	February 17, 2013, 02:36:39 pm by engrg1
	Ejs Open Source Long Magnet Falling Through solenoid Model Java Applet by LTL	lookang	8	2765	February 14, 2013, 10:09:19 am by lookang
	Primary School Speed Time	engrg1	6	2420	February 08, 2013, 07:01:56 pm by engrg1
	Ejs Open Source Coulomb Force Model Java Applet	lookang	0	293	January 30, 2013, 05:01:02 pm by lookang
	Cooling/Heating Curve Remixed	engrg1	8	2769	January 02, 2013, 01:18:50 pm by engrg1
	Ejs Open Source Bar Magnetic Field Lines Model Java Applet	lookang	7	1896	December 20, 2012, 06:55:06 pm by Fu-Kwun Hwang

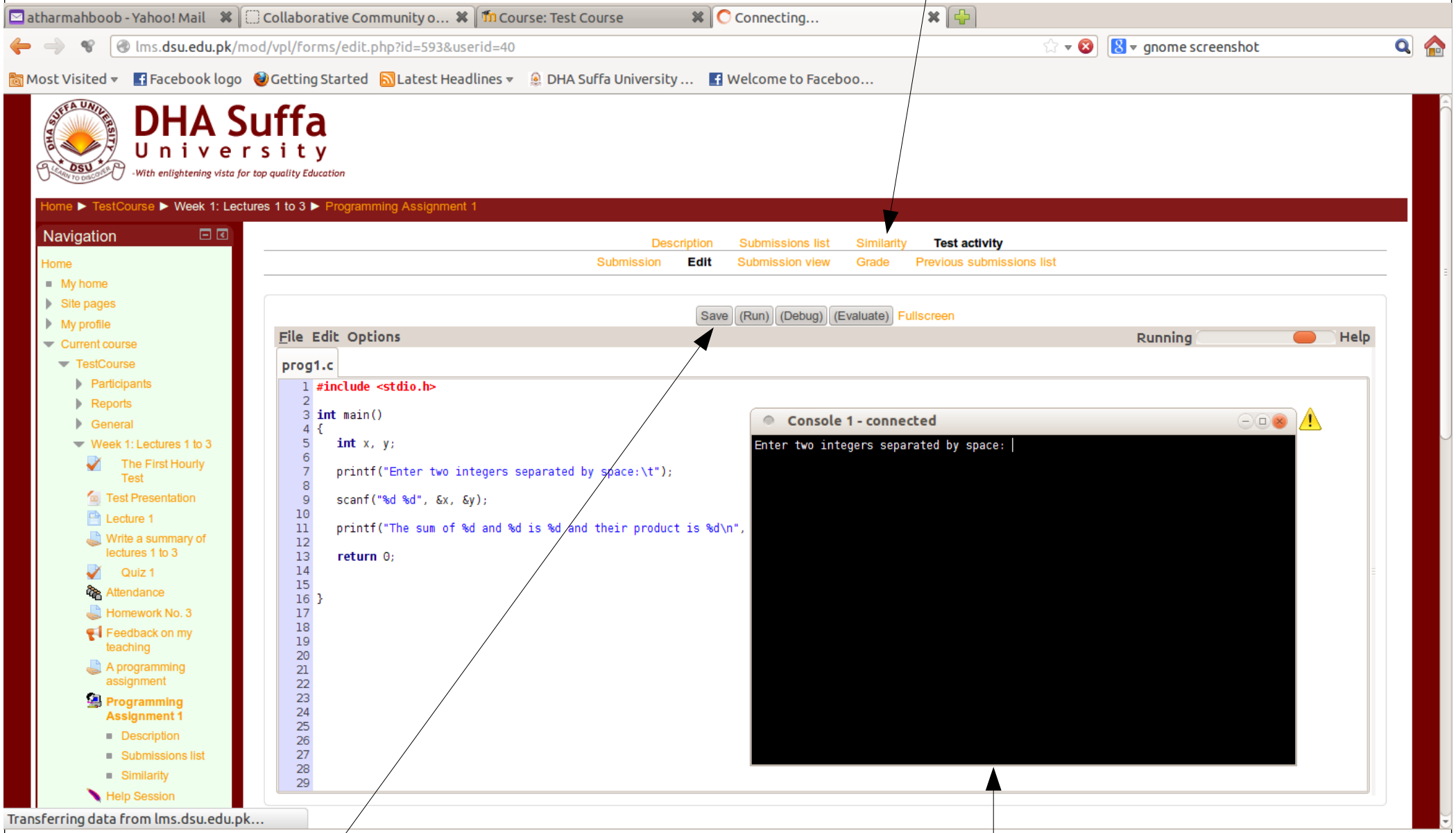
Virtual Programming Lab

http://vpl.dis.ulpgc.es/



- Makes grading programs easier
- Supports test cases
- Supports multiple programming languages
- Checks for plagiarism
- Allows setting editing restrictions and avoiding external text pasting.

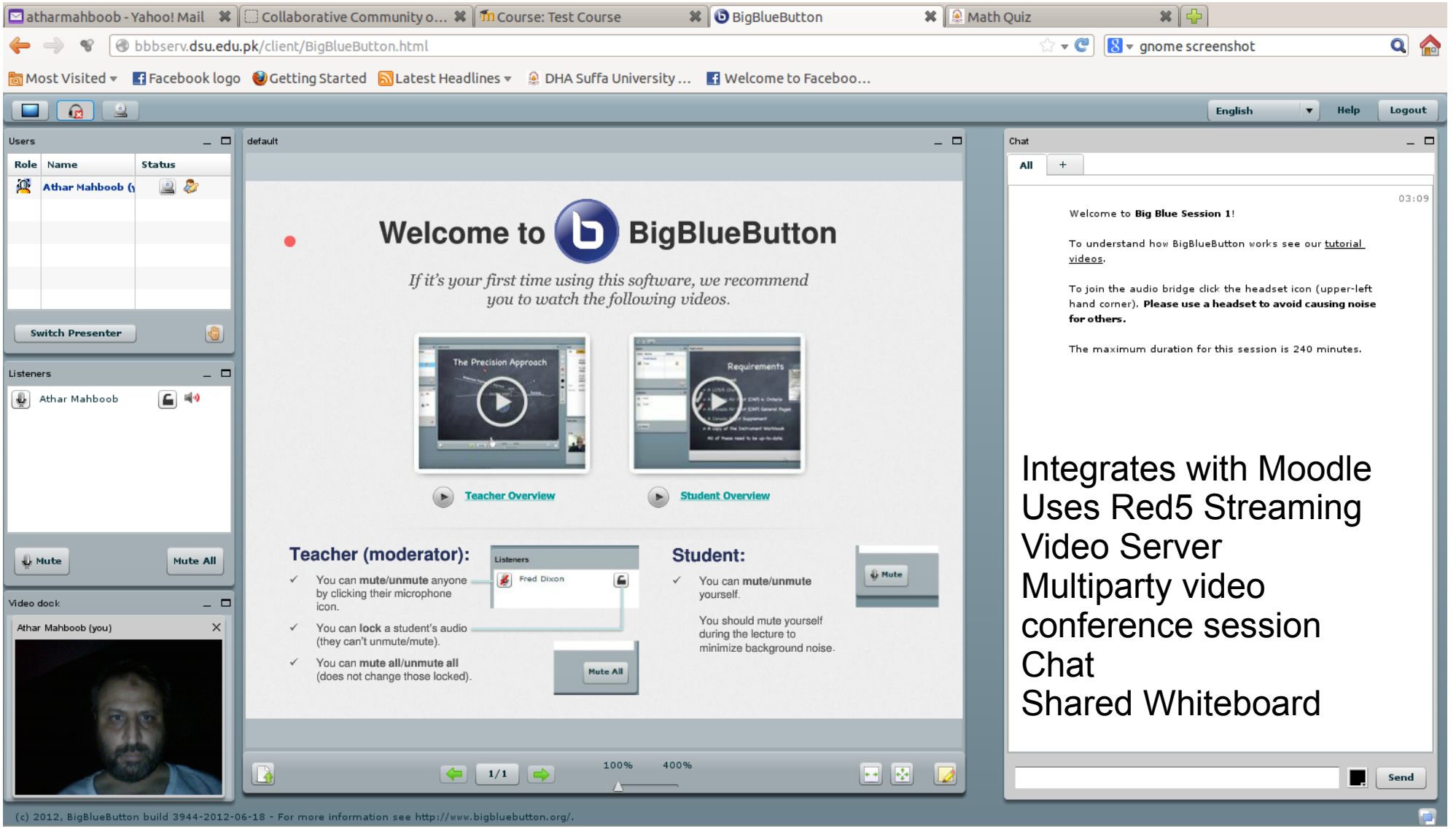
Plagiarism checker



Program can be edited online

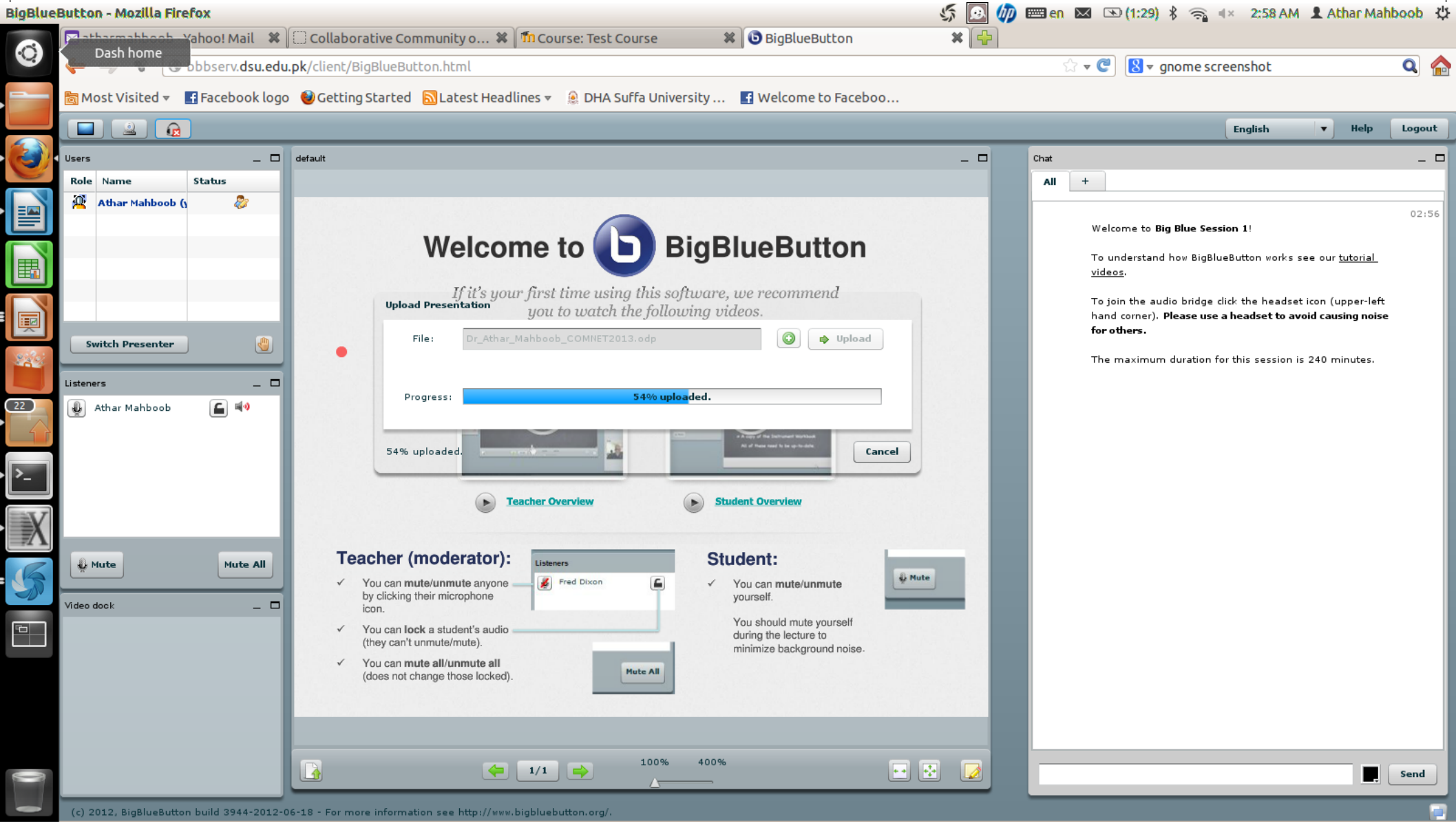
Compiled program running

BigBlueButton – In Action

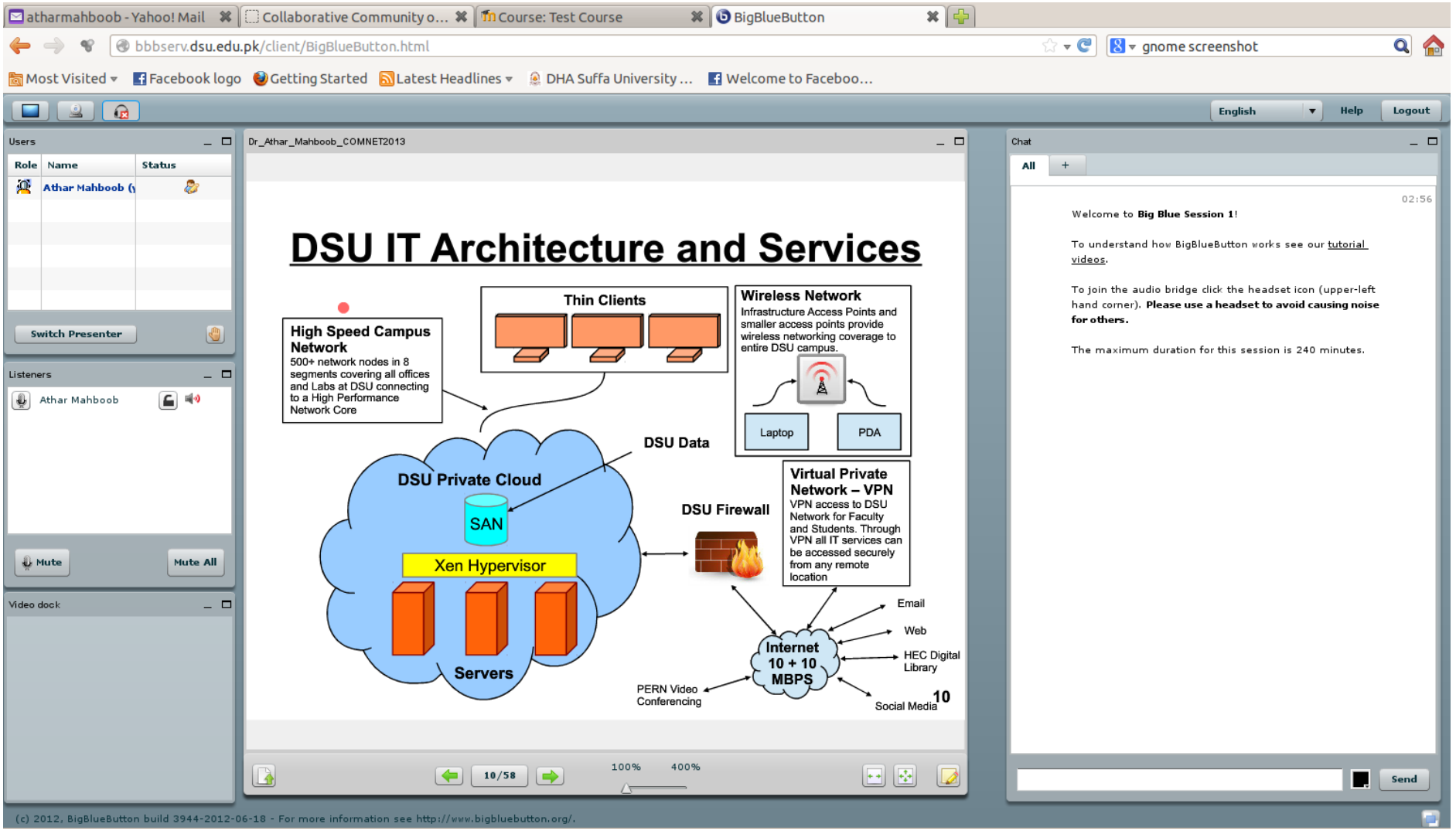


Integrates with Moodle
Uses Red5 Streaming Video Server
Multiparty video conference session
Chat
Shared Whiteboard

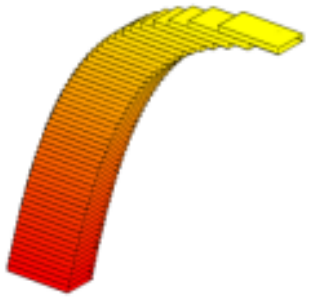
Uploading Lecture Presentation



BigBlueButton



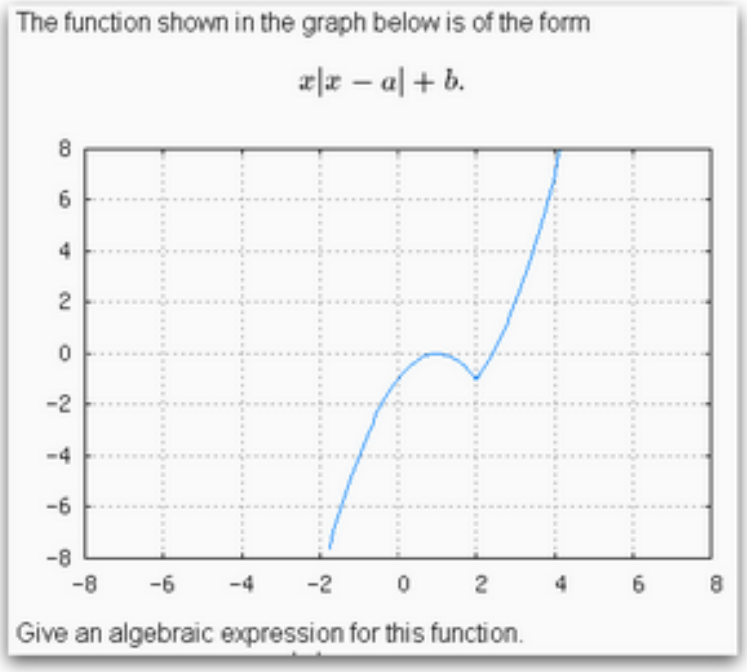
STACK - http://www.stack.bham.ac.uk/



System for
Teaching and
Assessment using a
Computer algebra
Kernel

STACK is an open-source system for computer-aided assessment in Mathematics and related disciplines, with emphasis on formative assessment.

Contact us: e-mail.



Demo

Download

Docs

STACK in action as Moodle Quiz

atharmahboob - Yahoo! Mail | Collaborative Community o... | Course: Test Course | Math Quiz

lms.dsu.edu.pk/mod/quiz/attempt.php?attempt=32

Most Visited | Facebook logo | Getting Started | Latest Headlines | DHA Suffa University ... | Welcome to Faceboo...

DHA Suffa University

With enlightening vista for top quality Education

Home ▶ TestCourse ▶ 11 February - 17 February ▶ Math Quiz ▶ Preview

Quiz navigation

1

Finish attempt ...

Start a new preview

Navigation

- Home
- My home
- Site pages
- My profile
- Current course
  - TestCourse
    - Participants
    - Reports
    - General
    - Week 1: Lectures 1 to 3
    - 21 January - 27 January
    - 28 January - 3 February
    - 4 February - 10 February
    - 11 February - 17 February
      - test1
      - **Math Quiz**
        - Info
        - Results
      - lab1
    - 18 February - 24 February
    - 25 February - 3 March
    - 4 March - 10 March
    - 11 March - 17 March

Question 1

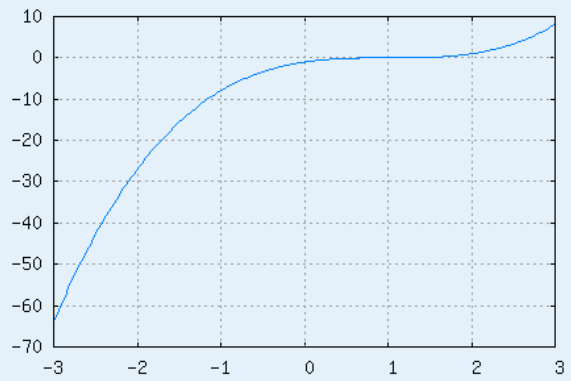
Not yet answered

Marked out of 1.00

Flag question

Edit question

Tidy question | Question tests & deployed versions



Differentiate

$$(x-1)^3$$

with respect to

$$x$$

.

Check

Next

Uses MathJax to render LaTeX Quality Math

atharmahboob - Yahoo! Mail | Collaborative Community o... | Course: Test Course | BigBlueButton | Math Quiz | Forgotten password

lms.dsu.edu.pk/mod/quiz/attempt.php?attempt=32&scrollpos=0#q1

moodle stack

Most Visited | Facebook logo | Getting Started | Latest Headlines | DHA Suffa University ... | Welcome to Faceboo...

Quiz navigation

1

Finish attempt ...

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    - 11 March - 17 March
    - 18 March - 24 March
    - 25 March - 31 March
    - 1 April - 7 April
    - 8 April - 14 April
    - 15 April - 21 April
    - 22 April - 28 April

Question 1

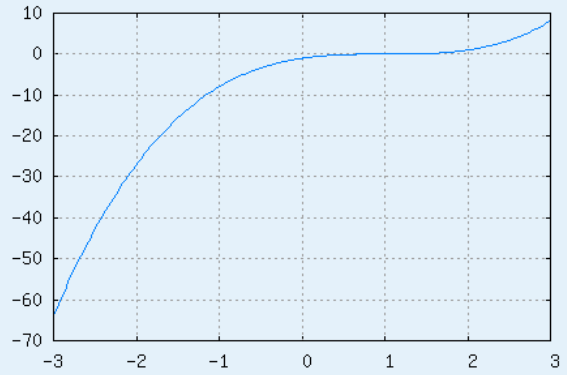
Incomplete answer

Marked out of 1.00

Flag question

Edit question

Tidy question | Question tests & deployed versions



Differentiate

$$(x-1)^3$$

with respect to

$$x$$

.

3*x^2-6*x+1

Your last answer was interpreted as follows:

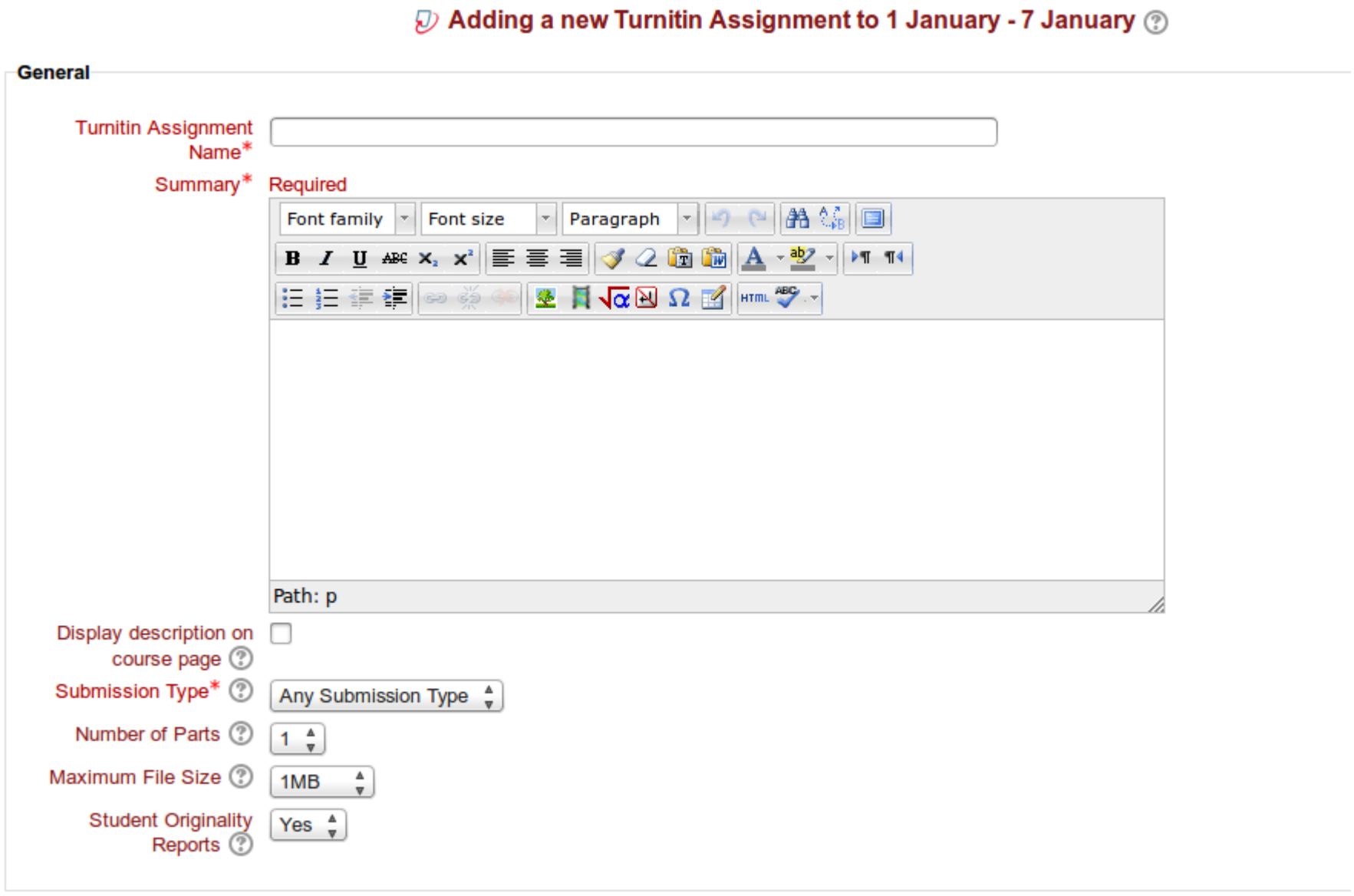
$$3 \cdot x^2 - 6 \cdot x + 1$$

Please verify that what you entered was interpreted as expected.

Check

Next

Moodle – Turnitin Integration / 1



Moodle – Turnitin Integration / 2

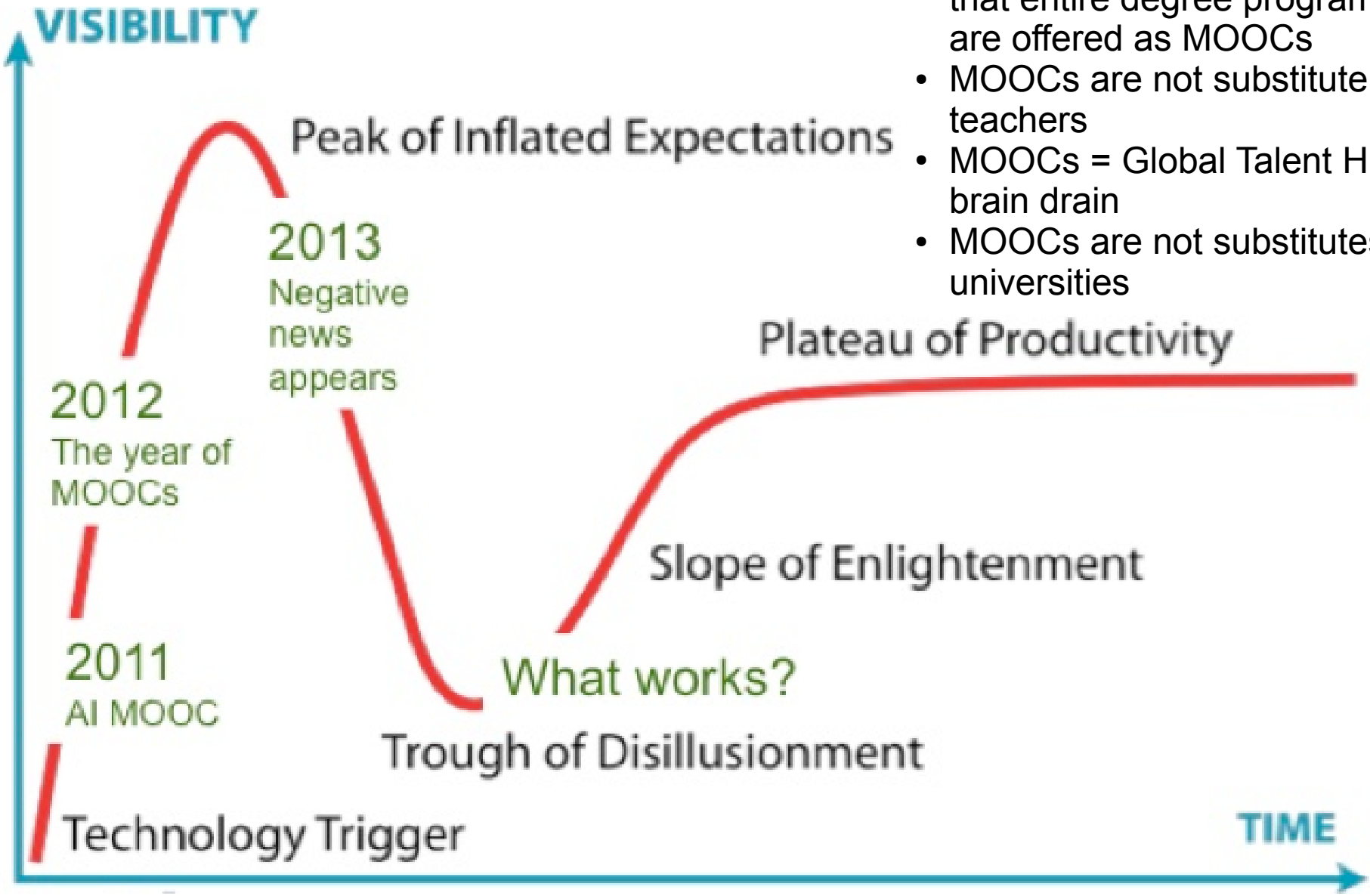
Turnitin Advanced Options

Allow Late Submissions	No
Report Generation Speed	Generate reports immediately, first report is final
Store Student Papers	Standard Repository
Check against stored student papers	Yes
Check against internet	Yes
Check against journals, periodicals and publications	Yes
Exclude Bibliography	No
Exclude Quoted Material	No
Exclude Small Matches	Words

Grade

Grade	100
Grade category	Uncategorised

MOOCs: Gartner Hype Cycle



- Many experts wrongly believe that entire degree programs are offered as MOOCs
- MOOCs are not substitute for teachers
- MOOCs = Global Talent Hunt = brain drain
- MOOCs are not substitutes for universities

Conclusion

- A Learning Management System (LMS) or Virtual Learning Environment (VLE) can be used to create a community of learners led by teachers
- These systems can used to augment the traditional classroom teaching or alternatively they may be used as a building block for Massive Online Open Courses (MOOCs)
- Open source Learning Management Systems such as Moodle offer great potential benefits and closely match the requirements and economics of Pakistani Academia
- Open source learning management systems can augment traditional teaching practices and thus contribute in enhancing the quality of higher education in Pakistan
- More than out of the box version of Moodle needed - use of specialized add-on modules related to Video Conferencing, Shared Whiteboards, Virtual Programming Lab, Computer Algebra Systems, Advanced Online Testing, Plagiarism detection and Use of CBT Modules within Moodle
- Create an LMS with high impact at low cost

Thank You !!!