



# University 2.0:

*Participative, Collaborative and Sustainable Learning*



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Presentation for  
CUHK Expo2011  
11 Nov 2011

**Why?**



## Response to rapid change

- Industries are reinventing and renovating
- Creating new opportunities

# Trends, Pull and Push: All Experiencing Rapid Change



# Demography: Era and People

- Traditionalists: born prior to 1946
  - Brand and retail store loyal, gone through the depression and war
- Baby Boomers: born 1946-64
  - Reminded to eat the plate clean. Into home and kitchens upgrade; enjoys gourmet food
- Generation X: born 1965-81
  - Likes to be educated and informed; no major enduring hard economical times
- Net-Geners/Millennials: born 1982-2000 (11 -29)
  - Live, breath, shop, link up on the web. Well informed.

# Gen Y, Millennials, Net Generation

## • Tech savvy

- Continually connected with IM, SMS
- Socially connected with devices

## • Achievement oriented

- Seek recognition, fame and feedback
- Wants meaningful work and a solid learning curve

## • Cosmopolitan

- Influenced by peers

## • Short attention span

- Skim text and information quickly

## • Team-Oriented

- Value teamwork and seek the input and affirmation of others
- Loyal, committed and wants to be included and involved



AWESOME  
**GREAT** SATISFIED ESSENTIAL CONNECTED  
HANDY  
WONDERFUL HELPFUL FRUSTRATING  
RELIABLE INDISPENSABLE FUN  
FANTASTIC COMFORTABLE IMPORTANT  
FRUSTRATED CONTENT expletive  
HATE HAPPY LOVE CONVENIENT  
NECESSARY GOOD  
EXCELLENT  
USEFUL NECESSITY ADEQUATE  
AMAZING EXPENSIVE ATTACHED  
VITAL FINE  
LIFE SUCKS  
LIKE FAIR COOL  
FUNCTIONAL  
EMERGENCY WORKS BEST  
ALRIGHT  
BAD  
COMPLICATED  
NEEDS  
IRRITATING  
FAIR-ANSOYING  
TERRIFIC

**What we have done**

# edveNTUre

Date of Birth: 17 May 2000

- depicts learning as an adventure to explore new frontiers of knowledge and that our NTU students are adventurous, creative and techno-savvy

e: electronic, everything!

ed: education

edveNTUre: our university's name "NTU" is embedded

Quick Reference Guide

Version 6 • August 2009

# edveNTUre: eLearning Eco-System

<http://edventure.ntu.edu.sg>

**NANYANG TECHNOLOGICAL UNIVERSITY**

Blackboard Guest Home Help Login

**edveNTUre**  
Learning Anytime Anywhere

Home Resources Webmail HelpDesk momeNTUM

### Login Here

Change Text Size  
 High Contrast Setting

Please enter your credentials and click the **Login** button below.

**Username:**

**Password:**

Forgot Your Password?  
**Login**

### Choose a Language Pack

**Available languages:**

- English (United States)
- Français (France)
- Português (Portugal)
- 中文 (中国)
- 日本語 (日本)
- 繁體中文 (台灣)

### eLearning Week

- Overview
- Schedule
- Staff Quick Guide

### Poll

What is your current smartphone ?

- iPhone
- Android

Home Values & honour code Policy For faculty Module **Quiz** Resources

## ACADEMIC INTEGRITY

Rising up to a 21<sup>st</sup> century challenge

**Attention all freshmen!**

Have you done the Academic Integrity Quiz yet?

Deadline: 26<sup>th</sup> September 2011

**Enter Now >**

Do you copy and paste? Find out how to do correct paraphrasing and proper references.

<< previous next >>

### Updates

Unable to view PDF in Safari?  
Get Schubert|it !

### Lecture Recording

Lectures are recorded.  
Re-experience it...

### edveNTUre Tutorials

### eLearning Tools

Various tools used in NTU to enhance Learning & Teaching

### Faculty Sharing

Sharing from faculty members on how they use technology to enhance learning and teaching

### momeNTUM

**Blog**

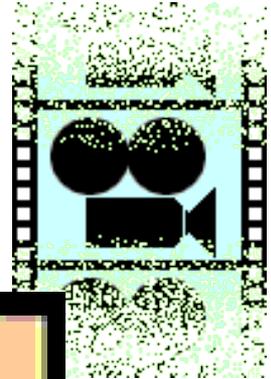


Blackboard

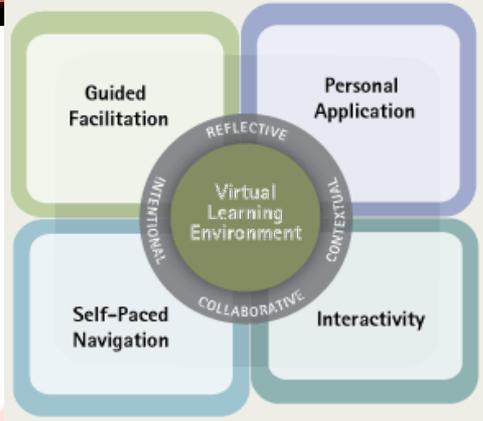


# Leaps of growth ...

- Jul 00 (Phase I: Mass buy-in, Efficient Learning)
  - 870 (51%) courses on-line, 20,000 users
  - 30,000 – 80,000 page views daily
  - Saturation levels for adoption number of courses, instructors and students
  - Critical mass buy-in and adoption
- Jul 02 (Phase II: Humanizing eLearning)
  - 1,349 (80%) courses on-line, 22,000 users
  - 100,000 – 300,000 page views daily
  - Change of content type - **Content+**
- Jul 04 (Phase III: Effective Learning)
  - 2,900 (>90%) courses on-line, 24,000 users
  - 300,000 to 600,000 page views daily
  - Content management system and re-use of content
- Jul 06 (Phase IV: eLearning 2.0)
  - 3.5M page-views/week
  - **Engaged and interactive learning**
  - Collaborative learning
  - Learning by discovery: **eUreka Project Work**



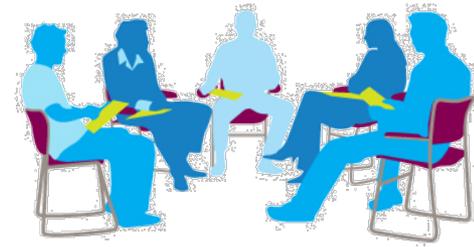
eUreka



# Leaps of growth ...

**2 billion page-views  
since inception!  
2,000,000,000,000**

- Jul 09 (Phase VI: **Learning Continuity**)
  - **eLearning Week** to support Learning Continuity in the event of campus closure
  - **Mass notification**
  - Establishment of CELT and Div of Pedagogical Practice
- Jul 11 (Phase VII: **Learning is Everywhere**)
  - **Mobile learning**
  - **Sustainable participatory & collaborative learning**
  - **Learning spaces**
  - **Student wellness**



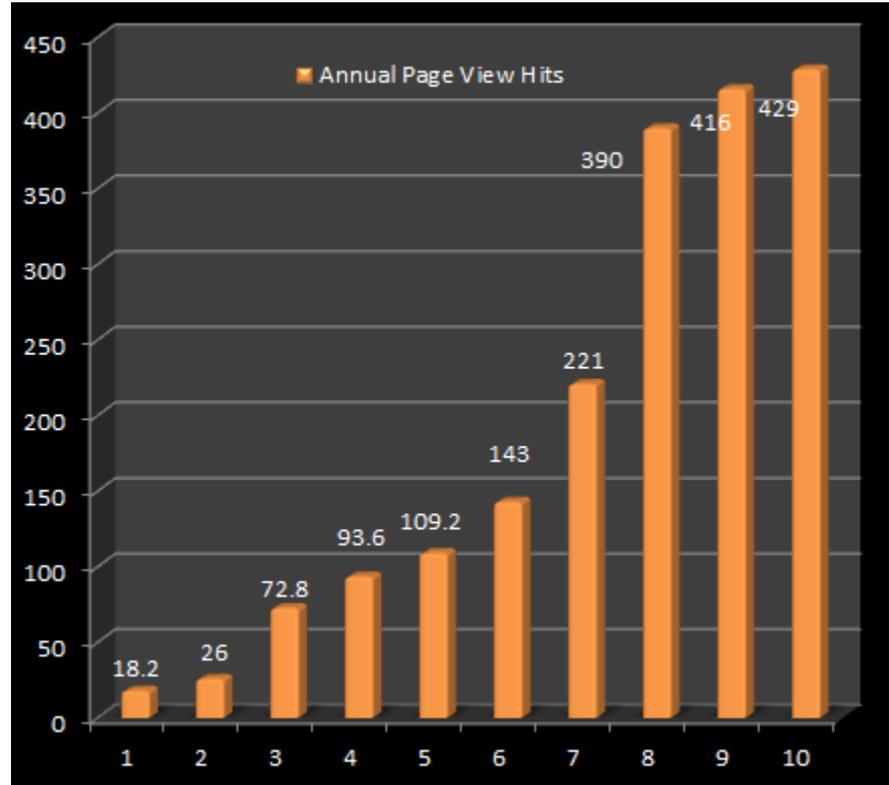
# System Usage: No. of Page Views (or mouse clicks)



Date	Number of page view per week
July 2000	250,000
July 2001	500,000
July 2002	1 million
July 2003	2.1 million
July 2004	2.5 million
July 2005	3 million
July 2006	3.5 million
July 2007	6 million
July 2008	9 million
July 2009	9.35 million
Aug 2010*	10.1 million

\* Semester 1 started on 30 Aug 10 owing to Youth Olympics Games

**July 2011** **12 million**



**2 billion cumulative page view hits since July 2000**

**July 2011 – June 2012**  
**Estimated 0.5B page views per year**



# Features of edveNTUre

The screenshot shows the 'Course Documents' section of a course page. It includes a sidebar with navigation options like 'Announcements', 'Course Information', 'Staff Information', 'Course Documents', 'Assignments', 'Discussion Board', 'External Links', 'Resources', 'Course Map', 'Control Panel', 'Quick to Control', and 'Administrator System'. The main content area is titled 'Current Location: Top' and contains sections for 'Lectures', 'Handouts', 'Video', 'Lecture Supplement', and 'Tutorials'. The 'Lectures' section states: 'Only one module consisting of 3 lectures is available in this demo version. The whole course has 14 modules or 36 lectures. These slides are with narration. Turn on the speaker. The files are large self-extracting archives, therefore it will take some time to download the file and 1-2 minutes to start it. Advance slides by hitting Enter, Space Bar or Left click on it. You may also right-click at the slide and select where to go by the slide's title. If you want to repeat the slide, hit PageUp and then PageDown.'

The screenshot shows the 'Discussion Board' section of a course page. It includes a sidebar with navigation options like 'Announcements', 'Course Information', 'Staff Information', 'Course Documents', 'Assignments', 'Communication', 'External Links', 'Tools', 'Resources', 'Course Map', 'Control Panel', 'Quick Control', and 'Administrator System'. The main content area is titled 'Discussion Board' and contains a list of posts. The posts are organized into a table with columns for 'Subject', 'Author', and 'Date'. The subjects listed include 'Refresh Rate vs Frame Rate', 'Bilinear SURFACE', 'In between', 'XYZ fixed angles', and 'On about [roll]pitch[yaw]'. The authors listed include 'Anonymous', 'Alexei Sautin..', and 'CHOW CHING SIANG..'. The dates range from 'Mon Jan 21 2002 11:11 pm' to 'Mon Apr 15 2002 10:11 am'.

- Content Creation and Delivery
- Online Assessment

- Community Learning
- eUreka Project Work

The screenshot shows the 'Online Assessment' section of a course page. It includes a sidebar with navigation options like 'Announcements', 'Course Information', 'Staff Information', 'Course Documents', 'Assignments', 'Communication', 'External Links', 'Tools', 'Resources', 'Course Map', 'Control Panel', 'Quick to Control', and 'Administrator System'. The main content area is titled 'Quiz 1' and contains instructions: 'Answer the following questions, submit your answers, and see the result. The results of this quiz will not contribute to your final grade. The quiz is offered for practicing only.' The quiz consists of two questions: 'Question 1: Multiple Choice (1 points)' and 'Question 2: Multiple Answer (1 points)'. The questions are about computer graphics and computer-aided design.

The screenshot shows the 'eUreka' project work page. It includes a sidebar with navigation options like 'eUreka', 'Projects Home', 'Control Panel', 'Helpdesk', 'Search', and 'Go'. The main content area is titled 'My Projects' and contains a table of projects. The table has columns for 'No', 'Reference', 'Project Name & Description', 'Creation Date', 'Type', 'Supervisor', 'Tasks', and 'Past 7 Days Activity'. The projects listed include 'demo site 19 July Practice project site' and 'HSS - HW210 Tech Comm Project Site Project site for Information Sharing and Hands-on Session'.

**What we are doing**

# Operational Elements of University2.0@NTU (Today)

## edveNTUre

## Ecosystem Framework

Blackboard Learn

Course content delivery and communication  
Social and community of Learning through  
Web 2.0 social media

Blackboard Mobile Learn and Central

Mobile learning and services

Blackboard Connect

Campus Emergency Alerts, Outreach and  
Course Notifications

SafeAssign, Turnitin

Plagiarism Management

PreseNTUr

Lecture Recording

aNTUna connect

Virtual communities and instant messaging

eUreka

Project Work Management System

Clickers Audience Response System

Participating and active learning in Lectures

LAMS

Re-usable learning pathways

# Emerging Campus-wide Projects

- Learning space designs
- Mobile Learning
  - Bb Mobile
- Mass (emergency) notification
  - Bb Connect
- Student Wellness, Support and Advising
  - Starfish Retention System



What are we  
thinking...

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{x^2}{2\sigma^2}}$$

**Σ** Sigma Model **σ**

q=68%

q=95%

q=99,9997%

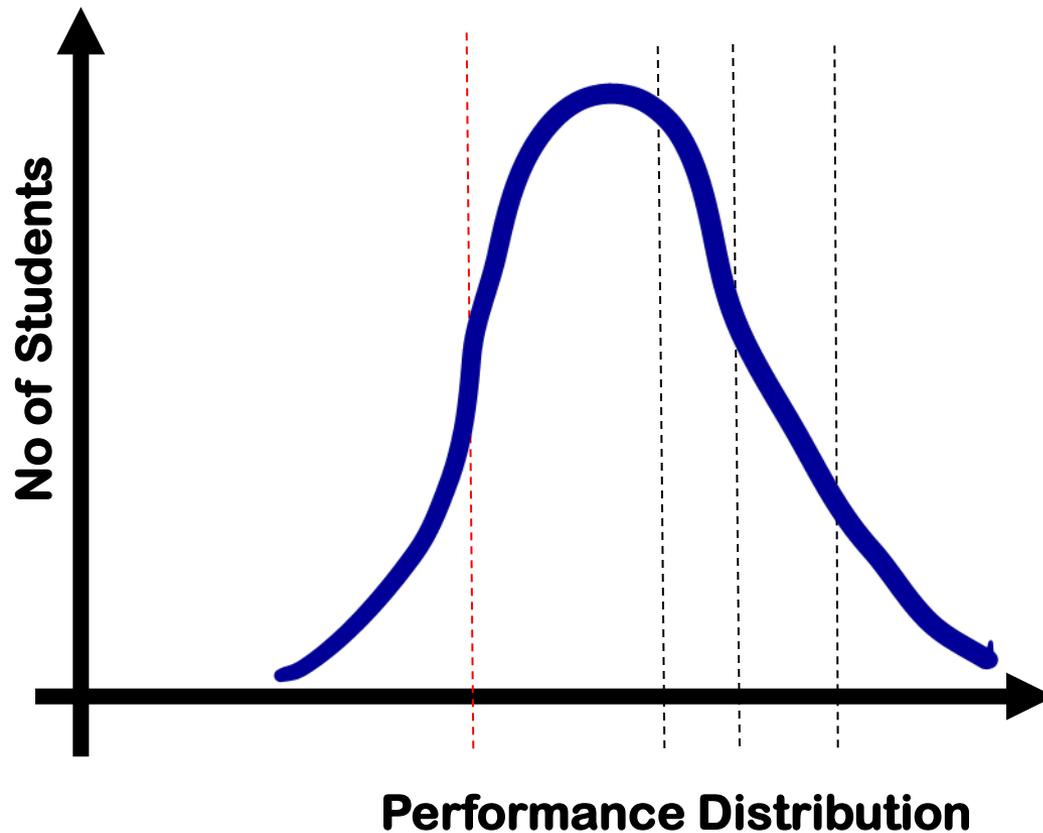
$\pm 1 \sigma$

$\pm 2 \sigma$

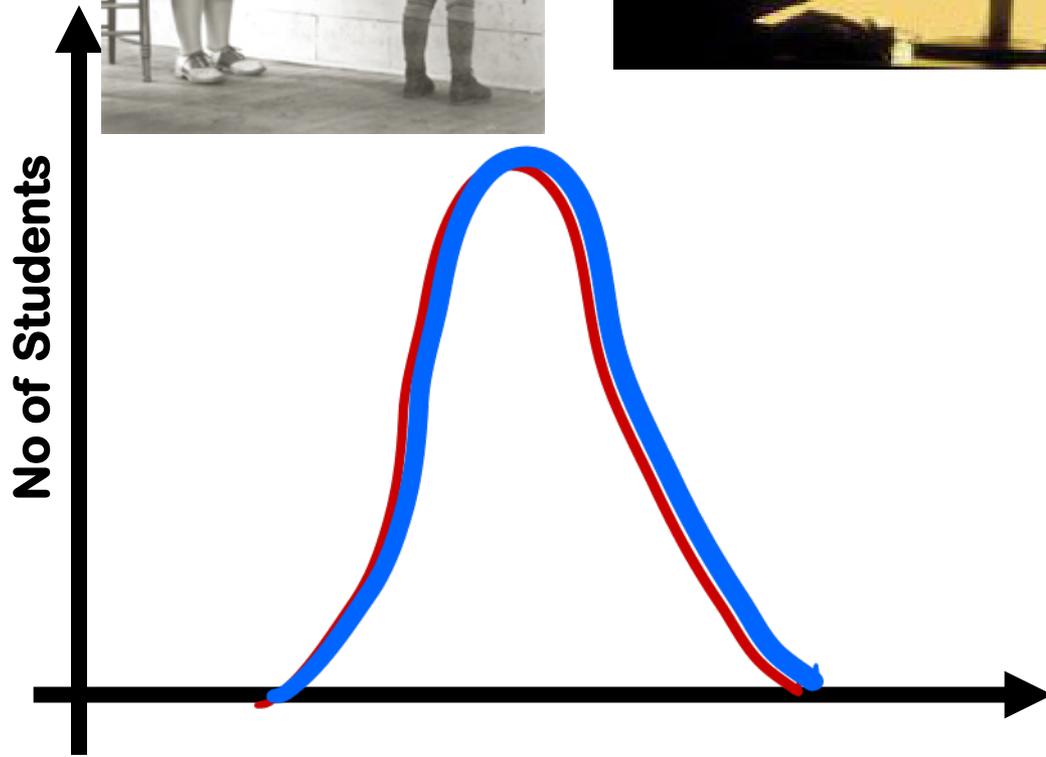
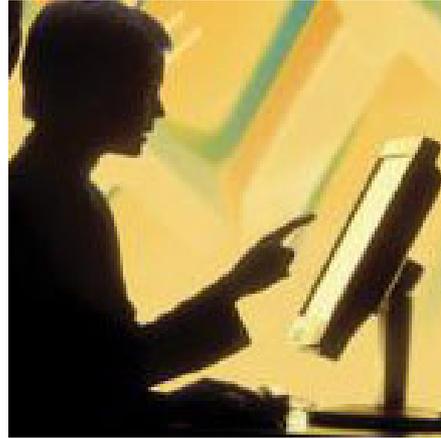
$\pm 6 \sigma$

# Unique in Education

## Performance Curve

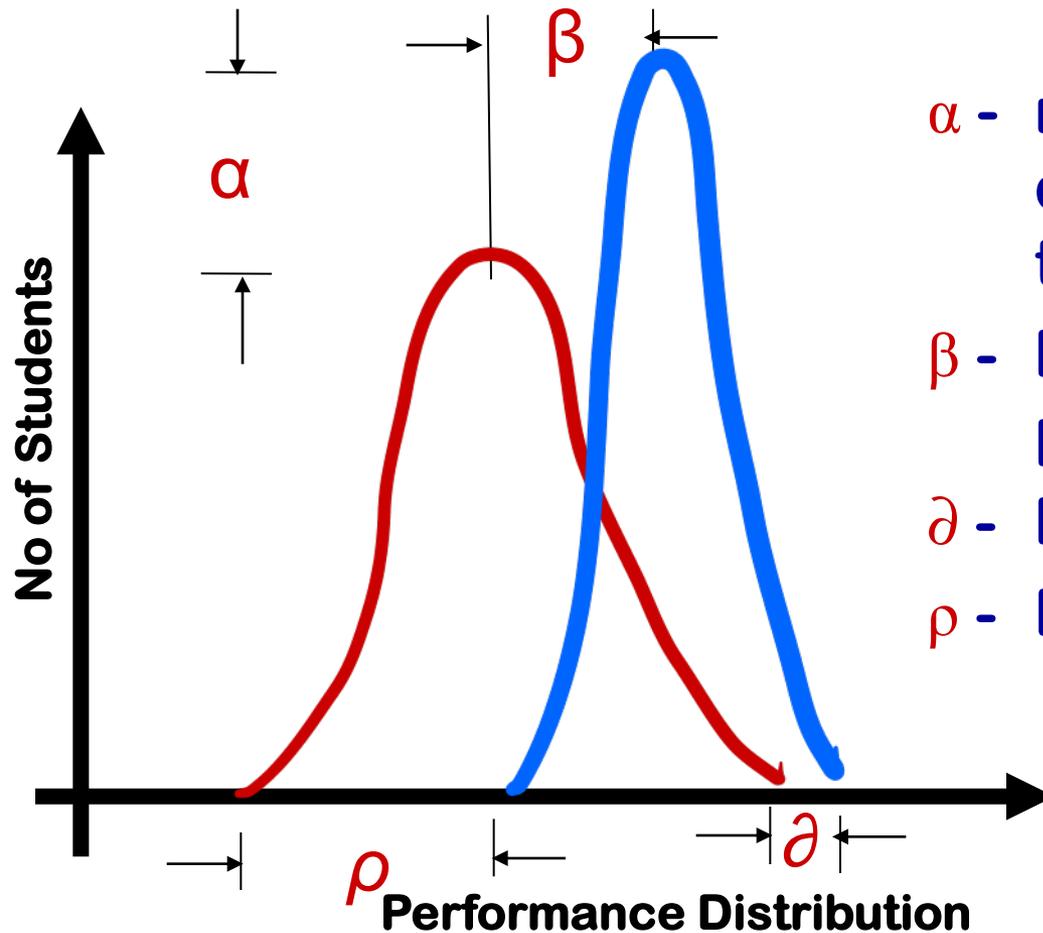


**Fact #1:  
Education  
do not  
guarantee  
its  
products....**



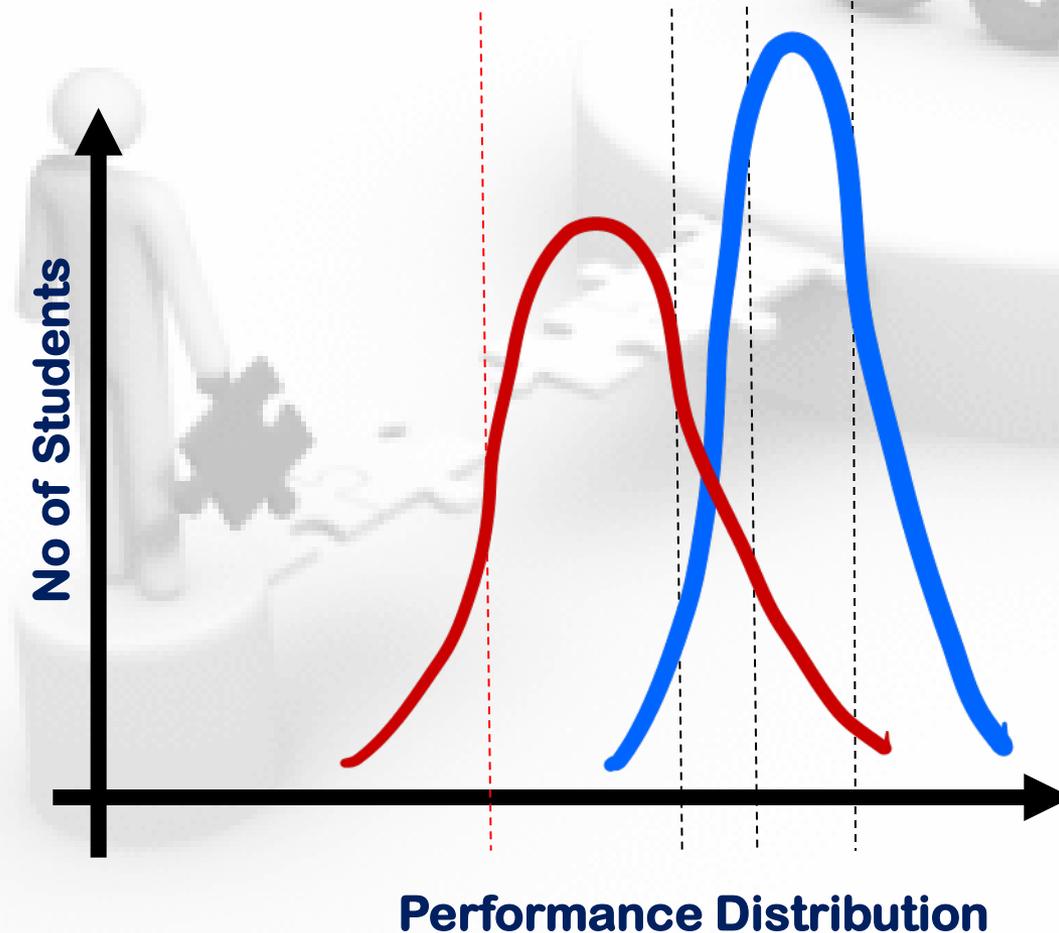
**Fact #2:  
Effectiveness  
of traditional  
face-to-face  
learning and  
eLearning is  
about the  
same.**

# Effectiveness – the mature model



- $\alpha$  - more students doing better (peak-to-peak)
- $\beta$  - better mean student performance
- $\delta$  - higher performance
- $\rho$  - lower failure rates

**If we can reverse engineer the outcome, what can we do?**

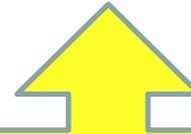


**Starting with the end in mind, what can we do to achieve this desired outcome?**



*if  
and  
then*

**Content is King  
Infrastructure is god  
Learning Activities will  
create the eXperience**



*Redefined roles of instructors  
using the new pedagogies*

**You have  
taught them;**

**Have they  
learnt?**



**Thomas C. Reeves**  
Professor Emeritus of  
Learning, Design, and  
Technology  
University of Georgia

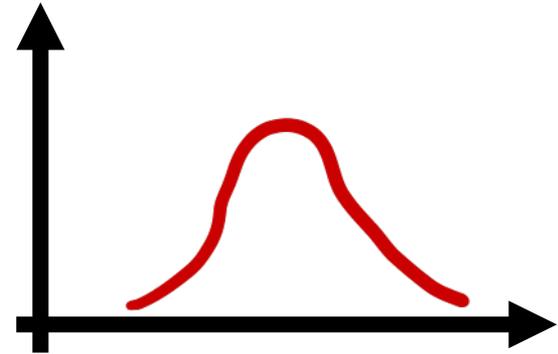
# Quality from Different Perspectives

- **Quality of content**
  - Usually not the issue
    - Standard textbooks, derivative material, multimedia courseware
- **Quality of teaching process**
  - You have taught them; have they learnt?

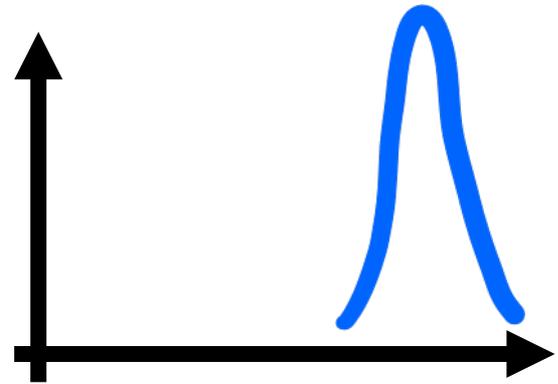
- **Quality of the (self-directed) learning process**
  - **Impact on**
    - Student performance,
    - Institutional reputation
    - Student value-add quality

**Sigma will answer:  
Yes/No**

Quality of Content  
Quality of Teaching



Quality of Learning



**A story about**

**“Content”**



volcano

About 12,900 results (0.07 seconds)



SafeSearch off ▾

Advanced search

Everything

Images

Videos

News

Shopping

More

Any time

**Past hour**

Past 24 hours

Past week

Past month

Past year

Custom range...

Sorted by  
relevance



Past hour ✕

▶ [Earthquakes at Iceland's Katla Volcano | Geology.com](#) +1

[geology.com/news/2011/earthquake-swarms-at-icelands-katla-volcano.shtml](#)

7 minutes ago - The Eruptions blog describes increased seismic activity at Katla **Volcano** in Iceland with ... An article on Stromboli **Volcano** describes the location, geology, plate ...

[Eruptions | Big Think](#) +1

[bigthink.com/blogs/eruptions](#)

by E Klemetti - [Related articles](#)

1 minute ago - **Volcanoes** don't run on schedule - and we have seen a number of ... If Katla were to erupt, the biggest threat will be to the areas around the **volcano** in Iceland, ...

[Volcanic Eruption News - Topix](#) +1

[www.topix.com/news/volcanic-eruption](#)

24 minutes ago - Iceland's Katla **volcano** has been the site of small but increasing earthquake activity but scientists said Tuesday there is no immediate concern that the increased ...

[Remote Alaska volcano might erupt soon, experts say | Flash News ...](#) +1

[flashnewstoday.com/.../remote-alaska-volcano-might-erupt-soon-experts-sa...](#)

46 minutes ago - Alaska: Alaska's Cleveland **Volcano** could soon be leaking from its flanks if the lava inside continues to build up, officials at the Alaska **Volcano** Observatory ...







# Perfect Storm: Convergence of independent developments



- Uniwood
- LAMS
- Blackboard LMS
- Participative learning

**Learning is  
Everywhere  
with Everybody!**

# Implementation:

## Learning is Everywhere - Social Learning



Participative

Collaborative

Sustainable

**How did you do it?**

**Show me!**

# Blended Learning

Think “transform, not transfer”

- a learning environment that exploits both, the benefits of face-to-face (F2F) and multiple technologies, to deliver online instruction

## Effective Learning

### Face-to-Face:

- social interactions in the classroom
- immediate feedback



### Online instruction:

- flexibility of delivery
- high availability of course content
- anytime, anywhere

# Blended Learning & HELP Model

- **HELP: Highly Engaged Learning Pedagogy**
- Online lessons populated with **interactive**, **participative** and **collaborative** content/activities
  - Pre-F2F off-class activities
  - Supplementary resources
  - Follow-up activities to post-class F2F lessons

## Advantages

- students can access content anytime, anywhere
- students enjoy a multimedia experience
- instructors can cut back on content delivered in F2F lessons

# eLearning Tools available in edveNTUre

**AcuLe@rn™**

Rich Media Communications

**Bb**

Blackboard

**LAMS**

**eUre!ka**





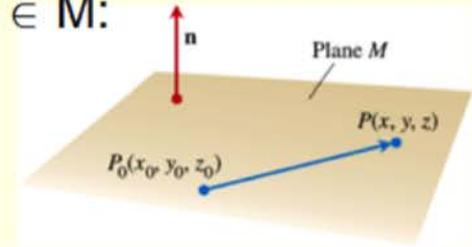
# preseNTUr for Self-paced Learning



- Playlist: Playlist1 00:05
- Equation for Planes in Space
  - Example
  - Equation for Planes in Space
  - Equation for Planes in Space
  - Example
  - Distance from a Point to a Plane
  - Example
  - Example
  - Angles Between Planes
  - Example
  - Intersection Lines & Normal Vectors
  - Example
  - Example
  - Further Reading
  - First Year Common Engineering FE1006
  - Mathematics 1

## Equation for Planes in Space

If  $P_0(x_0, y_0, z_0) \in M$ , and  $\mathbf{n} = a\mathbf{i} + b\mathbf{j} + c\mathbf{k} \perp$  to  $M$  then with  $\forall P \in M$ :



# Mobile Learning: Lecture Recording (Sample Output)



# Target: Campus-wide Full Capacity Recording

Qty	Description	No. of Recordings
40	number of LT locations	40
8	hours	320
5	days	1,600
13	week3	20,800
2	semester3	41,600

# Best Seat Location + Teleprompter



# Centralized Command Centre for Lecture Recording

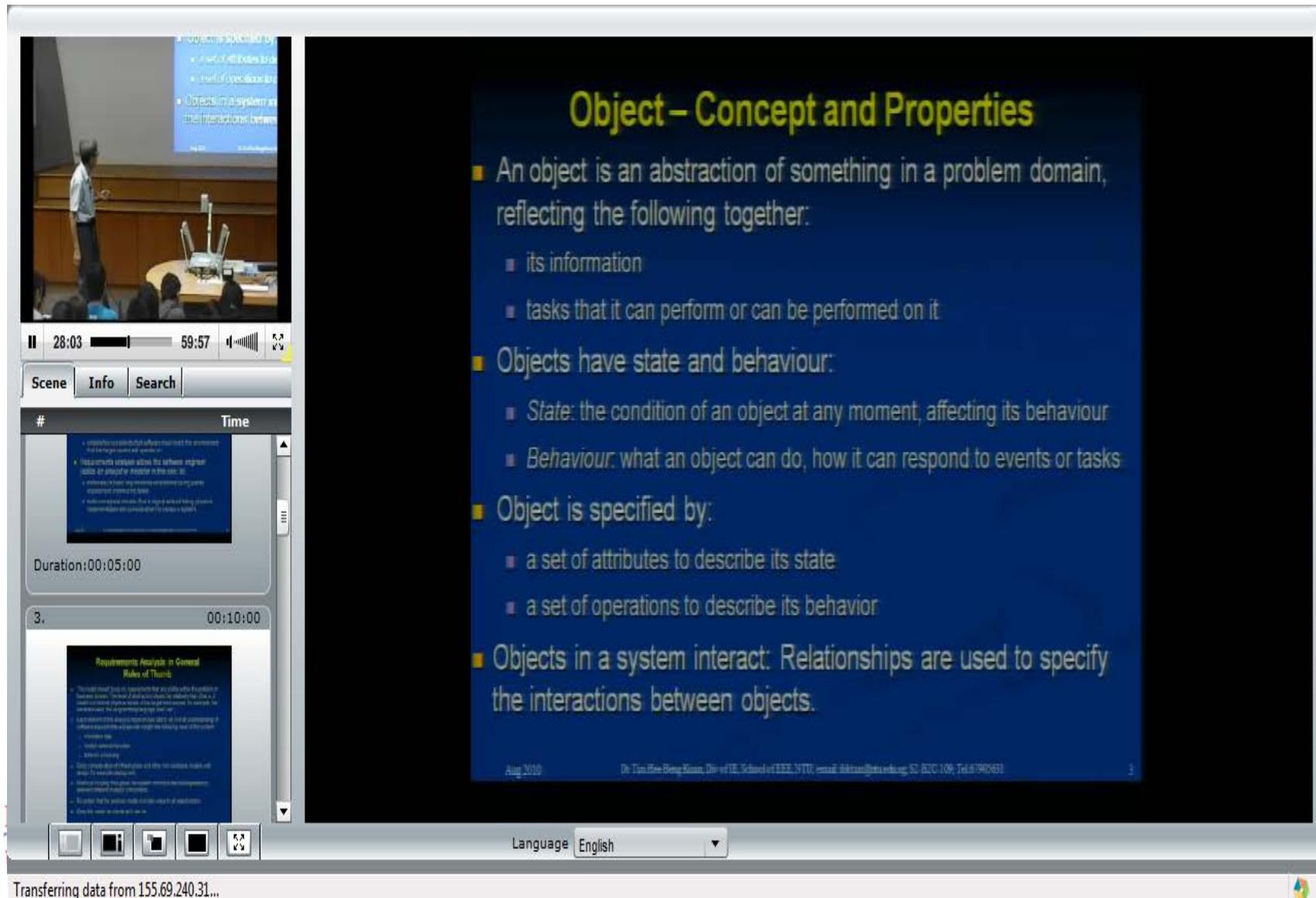


**Campus-wide Lecture Recording is a key strategic eLearning initiative endorsed by the University's management**

# Remote Monitoring at Centralized Command Centre



# Sample View of Recorded Lecture



The screenshot displays a recorded lecture interface. On the left, a video player shows a lecturer in a classroom. Below the video is a progress bar (28:03 / 59:57) and control buttons. A sidebar on the left contains a table of contents with a search bar and buttons for 'Scene', 'Info', and 'Search'. The main area shows a slide titled 'Object - Concept and Properties' with a bulleted list of definitions and characteristics. At the bottom, there is a language dropdown menu set to 'English' and a status bar indicating data transfer.

## Object - Concept and Properties

- An object is an abstraction of something in a problem domain, reflecting the following together:
  - its information
  - tasks that it can perform or can be performed on it
- Objects have state and behaviour:
  - *State*: the condition of an object at any moment, affecting its behaviour
  - *Behaviour*: what an object can do, how it can respond to events or tasks
- Object is specified by:
  - a set of attributes to describe its state
  - a set of operations to describe its behavior
- Objects in a system interact: Relationships are used to specify the interactions between objects.

Aug 2010 Dr. Tim-Ho-Hong Kwan, Director of E, School of EEE, Nanyang Technological University, email: thkwan@e.nyu.edu.sg, 62C 109, Tel: 67907631

Transferring data from 155.69.240.31...



# and the HELP Model

- **Learning Activities Management System**
  - Open-source software developed by Macquarie University
- **Easy to use; drag-and-drop interface**
- **Rapid content design development**
- **Many learning activity tools, supporting interactive pedagogy**
- **HELP Model enabled by pedagogically-driven activities**
- **Integrated into edve**NTU**re**

File Edit Tools Help

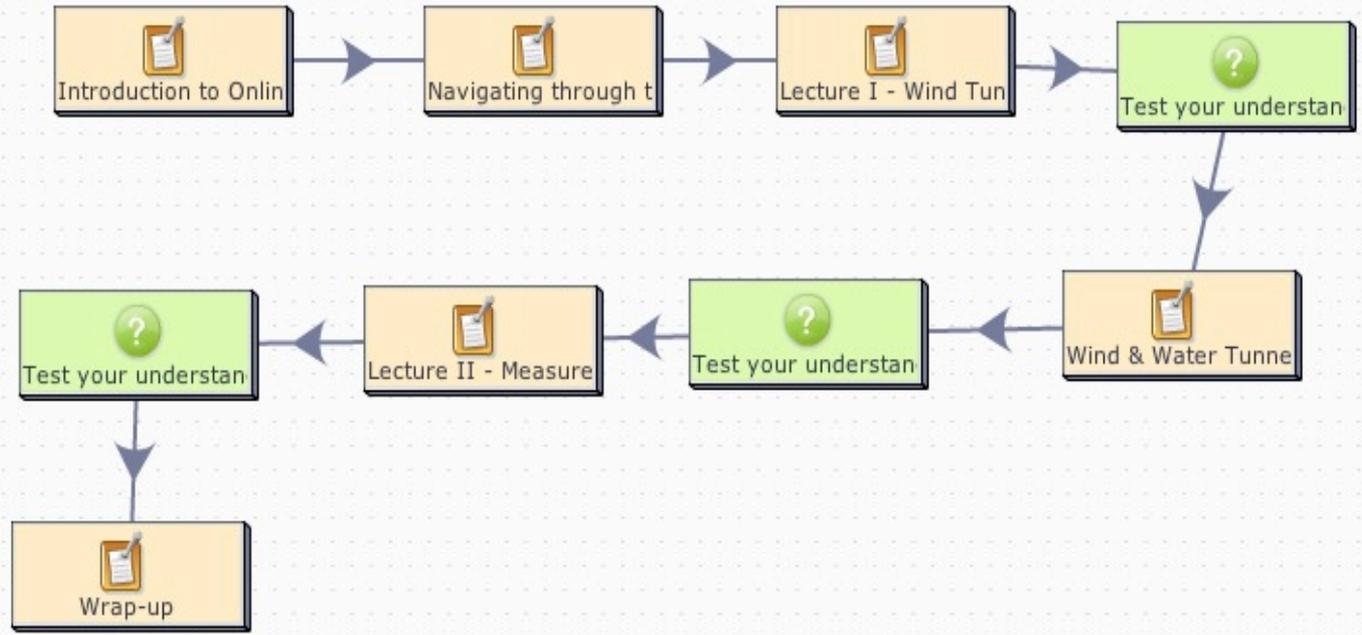
New
 Open
 Save
 Copy
 Paste
 Transition
 Optional
 Flow
 Group
 Preview

Activities Toolkit



- Assessment
- Chat
- Chat and Scribe
- Data Collection
- Forum
- Forum & Scribe
- Gmap
- Image Gallery
- Mindmap
- Multiple Choice
- Notebook
- Noticeboard
- Pixlr

Experimental aerodynamics



Properties



# Course Materials Presentation Interface

My edveNTure Courses My Filing Cabinet eUreka Community Resources Library Webmail System Admin Home Help Logout

M6426-MANAGEMENT OF TECHNOLOGY & INNOVATION (M6426-0752) > COURSE MATERIALS EDIT VIEW

## Course Materials

Video Lectures and Learning Activities (Please start here)	Notes
<p><b>Orientation and Demo</b></p> <ol style="list-style-type: none"><li><a href="#">Demo</a> (w/ vFAQ)</li><li><a href="#">Demo 2</a> (w/o vFAQ)</li><li>Can't view videos? Click <a href="#">here</a> for tips.</li><li>A <a href="#">Video Index</a> containing videos-only files will be released weekly after each class.</li></ol>	<p><a href="#">Study Guide</a></p>
<p><b>Lecture 1: Technology and National Competitiveness</b></p> <ol style="list-style-type: none"><li><a href="#">Introduction</a> (5:54) L1 1-7 (contains an overview page and a video lecture page)</li><li><a href="#">Productivity and Niche Strategy</a> (17:13) L1 8-20</li><li><a href="#">Multinational Corporations and Competitive Advantages</a> (17:58) L1 21-38</li><li><a href="#">Creating and Sustaining Advantage</a> (20:08) L1 39-53</li><li><a href="#">Global Strategy</a> (11:31) L1 54-60</li><li><a href="#">Discussion Board</a> (Your participation is compulsory)</li></ol> <p>Please review video lectures prior to the scheduled synchronous online meeting. There will be an discussion of the lectures during the online meeting.</p>	<p><a href="#">L1.pdf</a> (150KB)</p>

**Learning Activity Links**

Control Panel Quick Unenroll Refresh Detail View

# Course Material Presentation: LAMS

LAMS Learner - Windows Internet Explorer

http://lams.ntu.edu.sg/lams/learning/main.jsp?lessonID=1350

File Edit View Favorites Tools Help

Google G Go Bookmarks Popups okay Check AutoLink AutoFill Settings

LAMS Learner

LAMS

Resume  
Exit  
Export

M6426-07S2-1.1

1.0 Overview  
1.1 Introduction

Notebook

Title

View All Save

## 1.0 Welcome to M6426: An Overview

Please click the above link to view video again.

Welcome to M6426 Management of Technology and Innovation!

You are about to view an introduction to the course and a greeting message. Please click the Play button to start the greeting video. When ready, please briefly answer the quick question below and **submit your vote to proceed to the first video lecture** located in next page.

### Overview

One of the key course materials is a series of online learning activities containing video lectures, questions, and tasks that you can participate at your own pace or collaboratively with your classmates. The learning activities encourage you to integrate the knowledge learnt from this course and practical real-world cases, and to provide your own or synthesized perspectives to the key issues in management of product innovation and development at the enterprise to the national levels.

The goals of the learning activities are to help you reflect on your learning needs and to view diverse

Hits: 517 Playing: 0:00 / 1:02 s

# Participation and Engagement: Creating Purpose

LAMS

Resume  
Exit  
Export

DE-M6102\_Wk1\_demoV3

Welcome!

Introduction

SoM Approach

Reflection

Notebook

## Video 1.1: General Introduction

Please click the above link to view the video lecture. After viewing please answer the question below.



Time: 08:15

Notes: L1.pdf 1-5

Instructor: Ast/P Sunil Chandrakant Joshi

### Question 1:

What are your learning objectives for this course? Remember, there is no right or wrong answer. However, it is important for you to answer as best as you can.

### Answer:

Submit

# Student Engagement , Thoughts, Feedback, Comments and other Responses

M6426\_AY070852\_LAMS.pdf - Adobe Acrobat Professional

File Edit View Document Comments Forms Tools Advanced Window Help

Create PDF Combine Files Export Start Meeting Secure Sign Forms Review & Comment

21 / 194 104% Find

## 1.5 What is the difference between globalization and regionalization?

**HENG KHOON YEOW GERARD** 11 Jan 08 02:48:19  
Globalization is the increasing economic integration and inter...  
countries across the globe, while regionalization is similar to...  
except that it is applied to countries within a specified geog...

**LOW YOUNG HUAT** 12 Jan 08 01:27:4...  
When a business decides to go international by expanding its h...  
it has to decide and select which geographic markets to operat...  
its commitment, resources and internalization strategy.

Regionalization can means doing business within a continent or in...  
groupings like ASEAN, APEC, NAFTA and EU whereas globalization...  
widespread and significant operations across continents leverag...  
nation's competitive advantage. Eg, Electronical component...  
manufactured in China and final assembly and maketing...  
the Made in Japan status.

**ZAINUDDIN S/O ABDUL KADER A S** 14 Jan 08 (...)  
Globalization can be described as a process by which...  
are unified into a single society. This process is a com...  
technological, sociocultural and political forces while r...  
process by which the world becomes less interconnected, with a stronger  
regional focus



# Teaching Paradigm

- **Traditional Approach**

- Teacher teach
- Students listen and learn
- Assignments are given
- Assignments are submitted for marking
- Students read their marked assignments



## Participative Model

- Teacher teach
- Students listen and learn
- Assignments are given
- **Students participates online**
- **Students read their own and other peer contributions**



**Show me  
another  
example**

# Example: Experimental Aerodynamics

- **Background:**

- Professor interested in developing a package to help students better understand wind and water tunnels in exploring aerodynamics
- Limitation: wind and water tunnel facility cannot accommodate class of 140 enrolled students
- Solution: professor create documentary-style video to induct students to wind and water tunnels

## Dimensional Analysis

- For high speed flows even more problems:

$$\text{Ma} = \frac{U}{c} \quad \text{Re} = \frac{UL}{\nu}$$

- Ma and Re need to be held constant

Two possibilities:

1. Pressurized wind tunnel to change speed of sound
2. Assume Reynolds independency at high Re (incomplete similarity)



TOS TOC Info Note Chat

- 1 Aerodynamics: Tools (00:00:52)
- 2 Literature: (00:00:28)
- 3 Why Measurements? (00:01:28)
- 4 Planning an Experiment (00:03:04)
- 5 Unambiguous, Repeatable Experiment (00:01:44)
- 6 Wind Tunnel (00:01:30)
- 7 Open Wind Tunnel (00:02:15)
- 8 Contraction of a Wind Tunnel (00:02:01)
- 9 Laminar Wind Tunnel in Stuttgart (00:01:15)
- 10 Closed Wind Tunnel (00:03:10)
- 11 NASA Ames Wind Tunnel (00:01:12)
- 12 Dimensional Analysis (00:01:27)
- 13 Dimensional Analysis (00:01:06)
- 14 NTU Wind Tunnel (00:00:44)
- 15 NTU Water Tunnel (00:01:27)
- 16 NTU Water Tunnel (00:01:13)



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Lecture II - Mea...

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## Lecture I - Setup of Experiments and Wind Tunnels

The next activity is a lecture on how to plan and setup an experiment and on how wind tunnels are designed.

To access the lecture click on the link below.

[Recorded Lecture - Wind Tunnel \(25m 06s\)](#)



Next Activity ▶





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Wrap-up

## Answers from other Learners

### Question :

Wind tunnels take up a lot of space compared to the relatively small size of the test section that can be used for experiments. Can you explain why?

Because for wind tunnels, the Reynolds number must be sufficient for the flow to be fully turbulent and thus simulate the real flow.

Reduce TI

Flow of low Turbulence Intensity is required to conduct an accurate experiment in the wind tunnel, thus the wind tunnel needs to have various components such as the settling chamber, contraction cone, diffuser and drive section to ensure that the air flow is of high quality.

wind tunnel contains other sections in addition to the test section. these include the settling chamber and contraction cone. for the closed wind tunnel, there is an additional diffuser. these sections are important in creating the correct flow for the test to be carried out. The settling zone will take out disturbances in the air flow, the contraction cone will reduce turbulence intensity and the diffuser allows recycle of air.

- 1) settle flow to decrease turbulence.
- 2) increase speed of flow in test section.

The majority of the space taken up by the wind tunnel is used for:

- 1) to let disturbance die out (settling chamber)
- 2) reduced turbulence intensity (contraction cone)
- 3) move the air flow (drive section)
- 4) recycle the flow (for close wind tunnel)

Large contraction ratio is needed in wind tunnels to reduce turbulence intensity, and large contraction ratio need a large contraction chamber many times bigger than the test section. Also, a long gradual diffuser is needed aft of the test section to slowly expand the flow and prevent flow separation. These components thus result in a lot of space taken up by the wind tunnel.

The use of components, such as the settling Chamber, contraction cone and diffuser, to ensure the air flowing into the test section is of high quality and has a low turbulence intensity, result in the relatively large amount of space used for a wind tunnel.

it is to create a large settling chamber so that the TI value will be small, so as to attain a large contraction ratio

A lot of space is needed for the other components of the wind tunnel such as the diffuser, contraction and settling chamber. The settling chamber and contraction sections especially take up a lot of space as it needs to be many times the size of the actual test section in order to reduce Turbulence Intensity. As for a closed wind tunnel, additional space is needed for the drive section which is needed to circulate the air.

The wind tunnel consists of other components like the settling chamber which lets disturbances die out, contraction cone to reduce the turbulence intensity, diffuser and drive section which is made up of a large fan. Hence the overall size of the wind tunnel takes up a lot of

- Multiple varied answers to the same question
- Good, poor, incomplete, right, wrong, partial, model answers

**So?**

**What does all this  
mean?**

# Findings: Quality of Learning

- View video course content segmentation + interactive learning activities + group participation
  - More engagement as more senses are used
  - More active participation
  - More thought
  - More reflections
- More self-directed learning
- More peer-peer collaborative learning and assessment and latent feedback
- Develops more discerning learners
- Professors have a better gauge of students' learning

# Findings: Outcomes of Learning Activities

- Use of LAMS open-ended questions

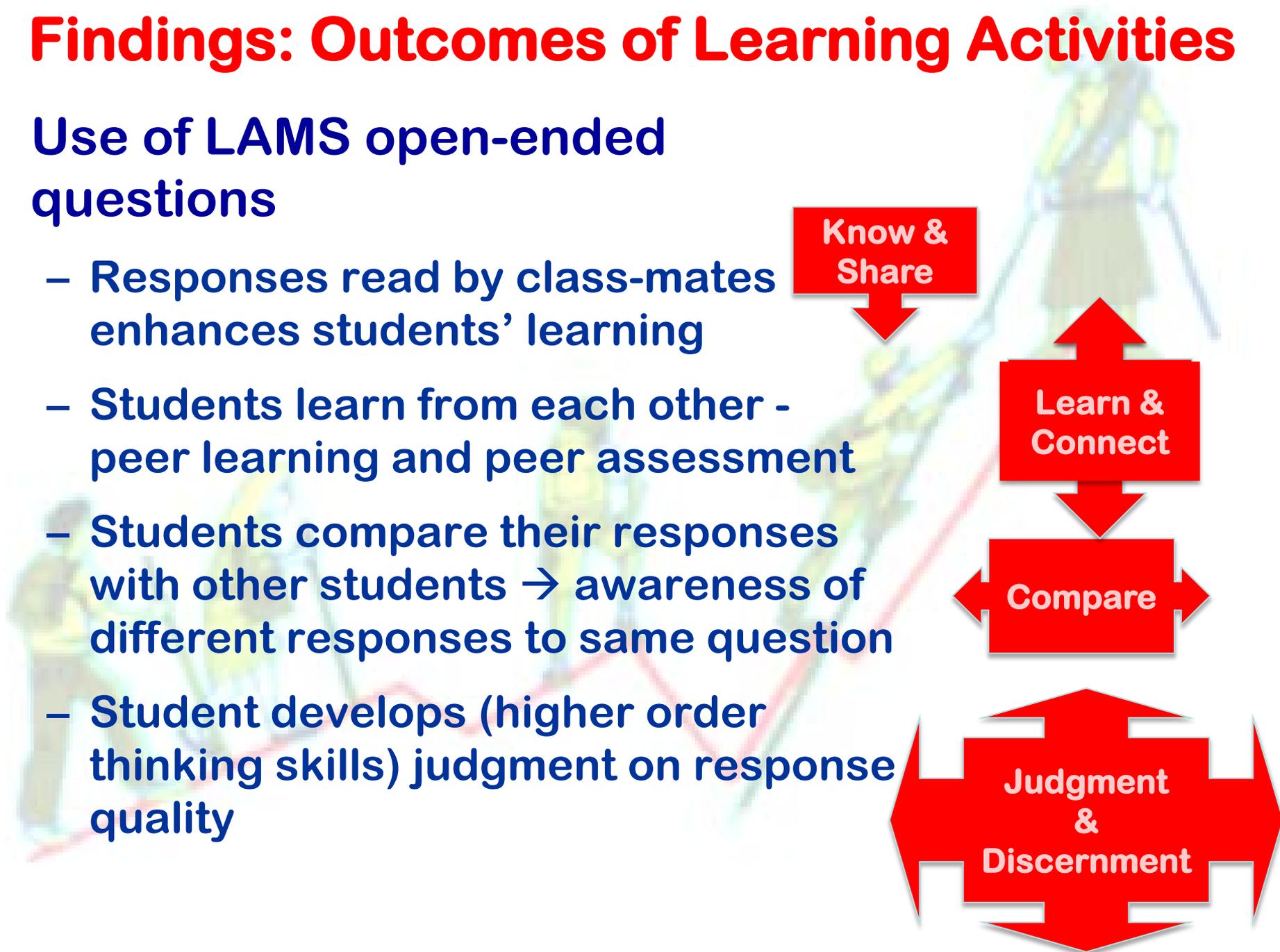
- Responses read by class-mates enhances students' learning
- Students learn from each other - peer learning and peer assessment
- Students compare their responses with other students → awareness of different responses to same question
- Student develops (higher order thinking skills) judgment on response quality

Know & Share

Learn & Connect

Compare

Judgment & Discernment





**You have  
taught them;**



**Have they  
learnt?**

**Quality in Learning**



**Thomas C. Reeves**  
Professor Emeritus of  
Learning, Design, and  
Technology  
University of Georgia

# Awards, Achievements and Recognition

- POPIA Bronze Award 2011
- IMS Learning Impact 2009
- ascilite Award 2008
- SiTF eLearning Organization of the Year 2007
- ZDNet Asia Smart50 Award 2006
- CIO 100 Honouree 2006
- National Health Group Distinguished Contributor Award 2005
- EMC Best Practice Award 2004 for eLearning Services
- CIO 100 Honouree 2004
- Intelligent20 Award 2003
- MoA With Blackboard: establishment of the Certified Education Centre
- MoA with LAMS International: establishment of LAMS Training Centre
- eLearning Centre of Excellence by Sun Microsystems



ascilite





Students who  
ask better questions,  
are independent learners,  
deep thinkers and ethical  
leaders of the future

Thank You!

**Assoc Prof Daniel Tan**

**Centre for Excellence in Learning & Teaching**

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