Social Learning 2.0: Better Teaching, More Learning
Participative, Collaborative & Sustainable
Student: Dr. Einstein, Aren't these the same questions as last year's [physics] final exam?

Dr. Einstein: Yes; But this year the answers are different.
Why?
Trends, Pull and Push: All Experiencing Rapid Change

Deep Demography

Fast Technology

Wide Globalization
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
- **Gen Y, Net-Geners/Millenials:** born 1982-2000 (13-31)
  - Live, breath, shop, link up on the web. Well informed.
  - Our students on campus
- **Gen Z:** born after 2001 (below 12)
  - Group activities
  - Multi-cultural, experiential, media-savvy
Democratisation of Content Knowledge and its Access

- Ubiquitous content
- Broadened access to higher education
- Content co-creators and participation
- Class-rooms beyond walls and campus
- Knowledge gateway in the hands of learners
Gen Y, Millennials, Net Generation

- Tech savvy
  - Continually connected with IM, SMS
  - Socially connected with devices
- Cosmopolitan
  - Influenced by peers
- Short attention span
  - Skim text and information quickly
- Achievement oriented
  - Seek recognition, fame and feedback
  - Wants meaningful work and a solid learning curve
- Team-Oriented
  - Value teamwork and seek the input and affirmation of others
  - Loyal, committed and wants to be included and involved
Training and Work Culture

Material of the following slides obtained from various Gartner Research reports
Conflict between Organizational Efficiency and Personal Productivity

Organizational Efficiency

Processes

Research

Support

Govern

IS

IT Infrastructure

Personal Productivity

Graphics reproduced with permission from Linköping University
Education Hype Cycle 2009: A Selective Technology Strategy Map

Improves... Remember "everything is relative"
Work Place Culture: Teaming and Collaboration Becoming Norms

Percentage of individual's work outcomes that depend on group input and actions

- **Different time, different place**
  - E-mail, document management.
  - Collaborative platforms

- **Same time, different place**
  - Audio-video conf, chat, groupware

- **Same time, same place**
  - Meeting support, huddle rooms, personal devices

- **Working alone**
  - Personal productivity

Work Styles

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**Workplace**

- E-mail, document management
- Collaborative platforms
- Audio-video conf, chat, groupware
- Meeting support, huddle rooms, personal devices
- Personal productivity
Key Issue: Which forces will disrupt the workplace, causing shifts in workplace behavior and technology investment?

• As work moves steadily toward the non-routine and the situational (vs. the routine and continuous), the rate at which people work collaboratively, just in time and in multiple teams will accelerate.
• By 2015, 80 percent of work outcomes will depend on input and cooperation of two or more people, and the work will seldom be done face to face.
• In other words, remote teams, projects, task forces and collaborative ventures will become the norm. With that change, however, comes significant implications for people's work habits, reward systems and workloads.
• Until high-performance workplace technology becomes seamless, the process of collaboration will be more burdensome than beneficial.

Action Item: Enterprises involved in information and knowledge-based work should re-examine work and assignments with an eye toward collaboration rather than singular output.
This workshop is aligned to MOE’s plan to impart 21st Century Skills to all student learners in Singapore, across the different school education levels by 2015. 21st Century Skills aim to prepare our students for a new generation workforce.

Continuum
If the rate of change on the outside exceeds the rate of change on the inside, the end is near.

Jack Welch

An organization's ability to learn, and translate that learning into action rapidly, is the ultimate competitive advantage.
"IF YOU DON’T LIKE CHANGE, YOU’RE GOING TO LIKE IRRELEVANCE EVEN LESS."
— GENERAL ERIC SHINSEKI, RETIRED CHIEF OF STAFF, U. S. ARMY
What are we thinking?
\[ f(x) = \frac{1}{\sigma \sqrt{2\pi}} e^{-\frac{x^2}{2\sigma^2}} \]
Fact #1: Education does not guarantee its products....
Fact #2: Effectiveness of traditional face-to-face learning and eLearning is about the same.

--- Traditional
--- eLearning
Effectiveness – the mature model

- $\alpha$: more students doing better (peak-to-peak)
- $\beta$: better mean student performance
- $\partial$: 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?
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
  - Library
  - Open Educational Resources

- **Quality of teaching process**
  - Professional & faculty development
  - Teaching evaluation

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

You have taught them

have they learnt?
Quality of Content
Quality of Teaching

Quality of Learning
New Pedagogy:
Quality in Learning
Learning Quality via Social Learning
Learning is Everywhere

Participative
Collaborative
Sustainable
Professor-friendly
Current and Near Future
Emerging Model

- Internet-based
- Education 3.0:
  - Participative
  - Collaborative
  - Teacher to student, student to student, student to teacher, people-technology-people (co-constructivism)
Paradigm Shift

Pedagogy
- Instructor-led
- Teacher-centric
- Scarcity of content
- Content-defined
- Sage on the stage

Andragogy
- Students as content creators
- Experience centred
- Highly accessible content
- Facilitated and constructivist
- Competency development

Heutagogy
- Self-determined study
- How (vs what) they learn
- Capability development

time
A story about

“Content”
Earthquakes at Iceland's Katla Volcano | Geology.com


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

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


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 ...

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 ...
Content Creators
Research Evidence

Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses

Richard R. Hake
Department of Physics, Indiana University, Bloomington, Indiana 47405

(Received 6 May 1996; accepted 4 May 1997)

A survey of pre/post-test data using the Halloun–Hestenes Mechanics Diagnostic test or more recent Force Concept Inventory is reported for 62 introductory physics courses enrolling a total number of students $N=6542$. A consistent analysis over diverse student populations in high schools, colleges, and universities is obtained if a rough measure of the average effectiveness of a course in promoting conceptual understanding is taken to be the average normalized gain $\langle g \rangle$. The latter is defined as the ratio of the actual average gain ($\% \langle \text{post} \rangle - \% \langle \text{pre} \rangle$) to the maximum possible average gain (100$-\% \langle \text{pre} \rangle$). Fourteen “traditional” ($T$) courses ($N=2084$) which made little or no use of interactive-engagement (IE) methods achieved an average gain $\langle g \rangle_{T-\text{ave}} = 0.23 \pm 0.04$ (std dev). In sharp contrast, 48 courses ($N=4458$) which made substantial use of IE methods achieved an average gain $\langle g \rangle_{IE-\text{ave}} = 0.48 \pm 0.14$ (std dev), almost two standard deviations of $\langle g \rangle_{IE-\text{ave}}$ above that of the traditional courses. Results for 30 ($N=3259$) of the above 62 courses on the problem-solving Mechanics Baseline test of Hestenes–Wells imply that IE strategies enhance problem-solving ability. The conceptual and problem-solving test results strongly suggest that the classroom use of IE methods can increase mechanics-course effectiveness well beyond that obtained in traditional practice. © 1998 American Association of Physics Teachers.

Cited 2171 times
Participative Learning to enhance Learning Quality

Learner Understanding During Lecture Presentation

- Professor’s belief
- Re-learn/review via lecture recording

30% Lecture

65% With clicker activities
Clickers: Learner Response Systems

Learner response system allows all students to respond to questions through the use of a Clickers device

Affordances in this technology:

- Inclusive: even quieter students will respond
- Non-threatening: psychosocial moratorium
- True feedback garnered
- Break the monotony of lecture

Professor-friendly processes:

- Clickers are issued to students at enrolment, and returned before graduation
- All teaching venues (LTs and class-rooms) fitted permanently with pre-set channels for RF receiver units
Example Question

A container of water rests on a scale. If you dip your hand into the water, without touching the container, what will happen to the reading on the scale?

1. Decreases
2. Remains the same
3. Increases
Moment of Truth
Blended 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 (content co-creation)
  - Students read their own and other peer contributions
Flipped Classroom?

**Typical**
- Students view pre-class recordings at home
- Gather together in class
- Discuss issues, etc with alpha-students dominating the discourse
- Teacher facilitate

**Participative Model**
- Students view pre-class recordings at home
- Online delivery and participation
- Equal all-must-participate opportunity
- Teacher moderate
- Participative and deeper collaborative learning
What we are doing
## Operational Elements of University 2.0@NTU (Today)

<table>
<thead>
<tr>
<th>edveNTUre</th>
<th>Ecosystem Framework</th>
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<tbody>
<tr>
<td><strong>Blackboard Learn</strong></td>
<td>Course content delivery and communication</td>
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<td>eUreka</td>
<td>Project Work Management System</td>
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<td>Clickers Audience Response System</td>
<td>Participating and active learning in Lectures</td>
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<td><strong>LAMS – Learning Activities Management System</strong></td>
<td>Re-usable learning pathways</td>
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<td>Analytics for eLearning</td>
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<td>Teaching Assistant (TA) Program Faculty of the Future</td>
<td>HWG702: University Teaching for Teaching Assistance</td>
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<tr>
<td>TR+</td>
<td>Classroom Learning Space for participative and collaborative learning</td>
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</table>

- **edveNTUre**: edveNTUre is a comprehensive ecosystem framework that integrates various tools and services to enhance the educational experience. It is designed to facilitate learning through a variety of mediums, including online platforms, mobile applications, and in-person activities.

- **Blackboard Learn**: A comprehensive learning management system that provides students and teachers with a platform to manage course content, assignments, and assessments. It also supports communication and collaboration through discussion boards, messaging, and social media integration.

- **Blackboard Mobile Learn and Central**: This component focuses on mobile learning and services, ensuring that students can access educational materials and interact with the learning platform on their mobile devices. It includes features that optimize the learning experience for mobile users.

- **Blackboard Connect**: Offers campus emergency alerts, outreach, and course notifications, ensuring that students and staff are informed of important updates and safety information.

- **Turnitin**: A plagiarism management tool that checks students' assignments against a vast database of published works to detect any instances of plagiarism.

- **Uni-wood**: A lecture recording system that enables students to review lectures, supporting participative and active learning.

- **eUreka**: A project work management system that helps in the coordination and execution of group projects, providing tools for task management and communication.

- **Clickers Audience Response System**: Supports participative and collaborative learning in lectures by enabling real-time interaction between students and instructors.

- **LAMS – Learning Activities Management System**: A tool that facilitates the creation of re-usable learning pathways, allowing educators to design and manage learning experiences more effectively.

- **edUtorium**: A faculty and professional program website that provides resources and support for educators.

- **Teaching Assistant (TA) Program Faculty of the Future**: This program offers training and resources for teaching assistants, preparing them for their roles in the educational setting.

- **TR+**: A classroom learning space that enhances participative and collaborative learning environments.
Old Tutorial Room Design
TR+: New Professor-friendly Learning Space
80 Tutorial Rooms
2 New Learning Hubs of over 60 TR+ each
Campus-wide Lecture Capture Project
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.
Mobile Learning: Lecture Recording
(Sample Output)
Crux of Content (including lectures) for Learning

• It is not the lack of content but the learner benefit-utility that is lacking
  – Usefulness
  – Relevance
  – Understanding
Impact and Usefulness of Lecture Recording

• Not learning more content
  – More content
  – More workload

• Learning (quality) better the content
  – Mastering the core content
  – Learn, re-learn, unlearn
Best Seat Location + Teleprompter
Centralized Command Centre for Lecture Recording (CCCLR)

- Campus-wide Lecture Recording is a key strategic eLearning initiative endorsed by the University’s management
- CCCLR: to ensure quality of content recording
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: Highly Engaged Learning Pedagogy
  – Enabled by pedagogically-driven activities
  – Integrated into edveNTUre
Learning Design Approach

• Focus on process, not just content

• Implicit collaborative Learning Activities in the design process

• Can incorporate single learner content and collaborative tasks
  – Discussion, voting, small group debate, etc

• “Wrap” Learning Objects with a sequence of collaborative tasks

• Learning Designs can be stored, re-used, re-purposed, customised
Example: Experimental Aerodynamics

• Background:
  – Instructor 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: instructor create documentary-style video to induct students to wind and water tunnels
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)
Dimensional Analysis

- For high speed flows even more problems:
  \[
  Ma = \frac{U}{c} \quad Re = \frac{UL}{\nu}
  \]
- \(Ma\) 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)
An example involving Experimental Aerodynamics
**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 after 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 space.
So?

What does all this mean?
Findings: Quality of we-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
Outcomes of we-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 critical thinking skills) judgment on response quality
You have taught them;

Have they learnt?

Thomas C. Reeves
Professor Emeritus of Learning, Design, and Technology
University of Georgia
Outcomes
## edveNTUre eLearning System Usage

No. of Page Views (or mouse clicks)

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### 2.5 billion cumulative page view hits since July 2000

Estimated 0.5B page views per year
Weekly Page Views
Aug – Nov 2012 (Acad Year 2012 Sem I)

Average page-views during semester time: 2.7M per day
Statistics for UniWood Lecture Recording

No. of new recordings in AY2012/13
> 18.9%↑

Record Hits in AY2012/13
1.63 million

Record viewership in AY2012/13
80.2 Years
UniWood

From AY2005/06 Sem I to AY2012/13 Sem II

55,562 video recordings
6,946,304 viewing hits
324.2 years of viewing time
Usage of Clickers by Students

- Using Clickers
- Issued with Clickers
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Old Tutorial Room Design
TR+: New **Professor-friendly** Learning Space
80 Tutorial Rooms
2 New Learning Hubs of over 60 TR+ each
Story of 2 Islands
“The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn”

Alvin Toffler
Learning is Everywhere with Everybody!

we-Learning
Thank You!

Centre for Excellence in Learning and Teaching
Assoc Prof Daniel Tan
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