Bigger Future of the Future of Education: Participative - Collaborative - Sustainable

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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.
“IF I HAD ASKED PEOPLE WHAT THEY WANTED, THEY WOULD HAVE SAID: FASTER HORSES...”

Henry Ford
Why?
#1

Generation Shift and Change in Student Profiles
Gen Y & Z Students

- **Tech savvy**
  - Continually connected on smart mobile devices
  - Socially connected

- **Cosmopolitan**
  - Influenced by peers
  - Social concerns
  - More universally homogenous

- **Short attention span**
  - Skim text and information quickly
  - Demand personal attention

- **Achievement oriented**
  - Seek recognition, fame and feedback
  - Wants meaningful work and a solid learning curve
  - Stronger entrepreneurial spirit

- **Team-Oriented**
  - Value teamwork and seek the input and affirmation of others
  - Loyal, committed and wants to be included, involved
  - Connected closer to friends than families
New World of Everywhere Everyone Everything Technology
A story about

“Content”
Observations

1. None of them went to the Library
2. Students become content co-creators
3. Students’ exploration not bounded by the curriculum or syllabus
4. Students will probably know more than their teachers
New skill sets required:
- Facilitate classroom and group management
- Letting go…..
Current and Near Future
Teacher
Didactic
Communicator
Knowledge transfer

Content
Textbook
Courseware

Learner
Receptor

Current Mode
Content-based
Teacher-centric

Education 1.0 Learners
- Receiving
- Responding
- Regurgitating

Reference: https://usergeneratededucation.wordpress.com/tag/education-3-0/
Emerging Model
Learning-based
Learner-centric

- Education 2.0 Learners
  - Communicating
  - Connecting
  - Collaborating

- Education 3.0 Learners
  - Connectors
  - Creators
  - Constructivists

Reference: https://usergeneratededucation.wordpress.com/tag/education-3-0/
Change in Work Place Expectations & Disconnect of Employers and Graduates
VUCA

VOLATILITY
Equity, bond and currency market volatility; the lack of stability and predictability.

UNCERTAINTY
The potential change in the inflation index calculation, the potential switch to "smoothing" for pension funds calculating their recovery plan; the lack of ability to foresee what major changes might come.

COMPLEXITY
In understanding these financial markets in the era of the "new normal". The proliferation and increasing complexity of new financial instruments and regulation to deal with increasingly complex markets, moving in ways experts have never seen before.

AMBIGUITY
The resulting feeling. Is this the great rotation from bonds to equities? Or will bond yields stay low for longer? What is the best course of action?
Training Network-Gen Students for Jobs Yet to be Invented

Worker Tasks in the U.S. Economy, 1960-2009
[all education groups]

- Non-routine interpersonal
- Non-routine analytical
- Routine manual
- Non-routine manual
- Routine cognitive

Education 1.0
Education 2.0/3.0

How & What
The **WHAT** to do next is easier when you know the **WHY**

Right answers are found in good questions
Specific Responses
#1 Dimensions of Quality
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

Student Population
Grades
#2 Social (Participative & Collaborative) Learning
New Pedagogies

It's not about matching traditional models with existing tools anymore

It's about developing a brand-new pedagogical model and implementing the Next Generation Web environment upon it.

• Antonio Fumero, 2006
Participative Learning to enhance Learning Quality


Learning Quality via Social Learning
Learning is Everywhere with Everyone

- Participative
- Collaborative
- Sustainable
- Professor-friendly
Learner Understanding During Lecture Presentation

- **30%** Lecture
- **65%** With clicker activities
- **Professor’s belief**
- Re-learn/ review via lecture recording
Traditional Classroom Design
Learning Spaces: X-Space Collaborative Classroom
#3

Learning Design

*Instructional (teacher-centric) design approach does not result in learner-centric outcomes*
if Content is King
and Infrastructure is god
then Learning Activities will create the eXperience and the context
Learning Design Potentials

1. Good learning design will yield higher level of consistency of assessment outcomes
2. Social learning will allow scale in implementation
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

• More info:
  • [https://www.lamsinternational.com/](https://www.lamsinternational.com/)
Online 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
- Students peer-rating
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:

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

- \( Ma \) 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)
An example involving Experimental Aerodynamics
An example involving Experimental Aerodynamics
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?
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
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 critical thinking skills) judgment on response quality
Back to Bloom
Bloom’s Taxonomy

- Knowledge
- Comprehension
- Application
- Analysis
- Synthesis
- Evaluating
- Applying
- Analyzing
- Creating
- Understanding
- Remembering

http://www.odu.edu/educ/roverbau/Bloom/blooms_taxonomy.htm
Bloom’s 2 σ Problem and Learning Quality

Achievement Score

Source: http://blog.coursera.org/post/50352075945/5-tips-learn-more-effectively-in-class-with
Benefits and Effectiveness of Social Learning

Source: Pierre Dillenbourg (LASI14, Harvard)
What kind of the university do you want?

Good universities teach

Great universities transform
Learning is Everywhere with Everybody!

we-Learning
Thank You!

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Addendum
Case Example:

Clickers

Face-to-face
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

Initial Attempt

After Discussion
Peer Instruction

Lecture Segment

Concept Test

Clicker Poll 1

< 30 % correct

Revisit concept

30–70% correct

Peer discussion

Clicker Poll 2

> 70% correct

explanation

Continue with teaching

Source: Mazur (2009 AAPT Winter Meeting Chicago, IL, 16 February 2009)
Feedback from students

“I feel that the clickers are quite a useful tool to get feedback from the class since it allows us to get feedback from all members of the class instead of just one or two people……”

“The most interesting thing about the class would definitely be using clickers ……. It also showed how some people’s views differed from others and this was brought to the center of the class and discussed instead of being written down and nobody would be able to see what anybody else answered…..”

“I found the clickers exciting. I have never come across this method of engaging the class. It actually helped to ease up the quiet atmosphere in class.”

“What I enjoyed the most was during the question and answer questions when we had to use our clickers to answer some questions posted on the screen…. More of such activities could have been incorporated into the lessons since it actually helped me learn much more than expected …..”
Importance, Impact and Relevance of Student Feedback

Visible Learning; a synthesis of over 800 meta-analyses relating to achievement

In education most things work, more or less.

The questions are around those which work best and therefore best repay the effort invested.
Hattie says ‘effect sizes’ are the best way of answering the question ‘what has the greatest influence on student learning’.

An effect-size of 1.0 is typically associated with improving the rate of learning by 50%, or a two grade leap, e.g. from a C to an A grade.