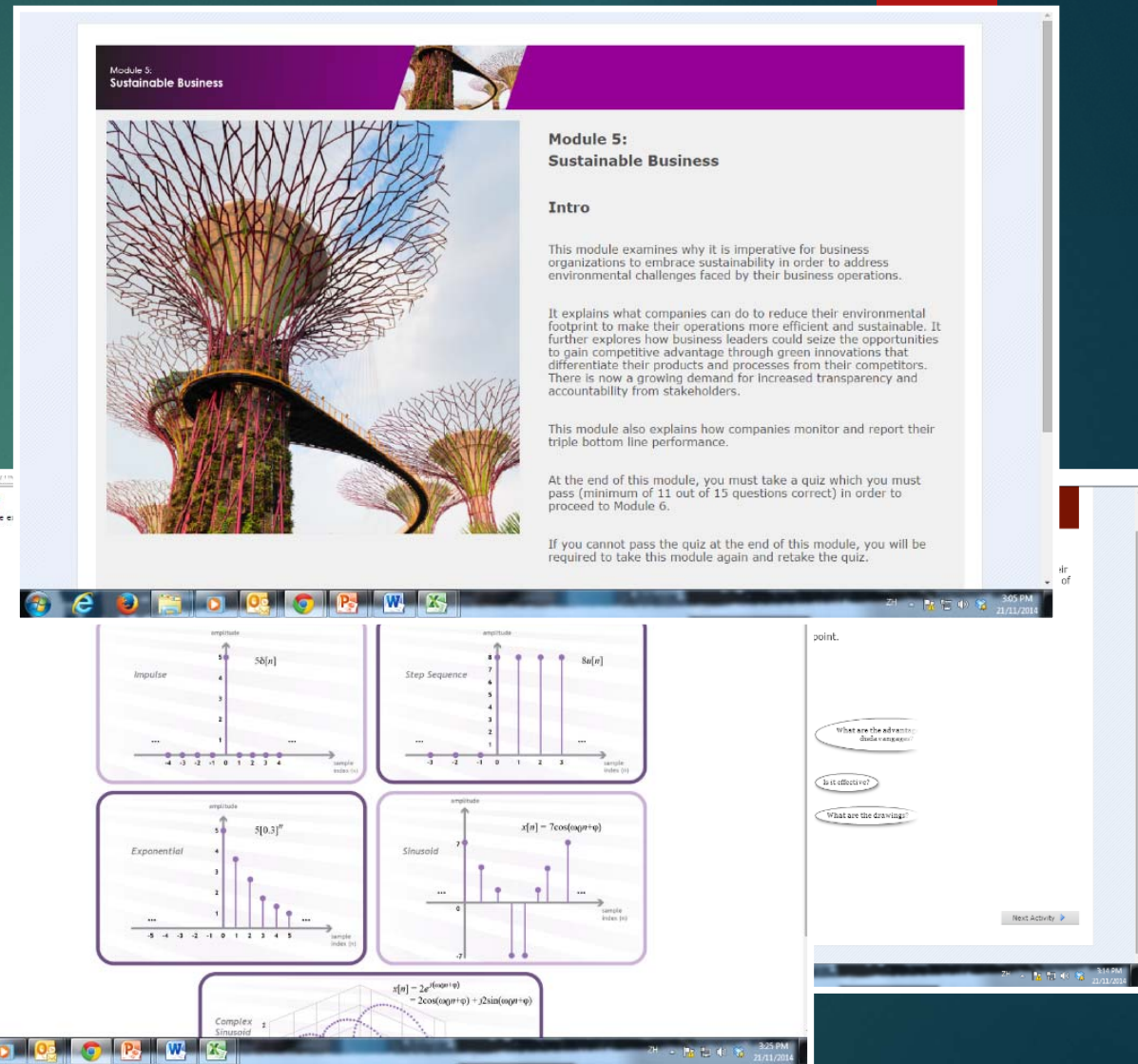


Large Class Implementation using LAMS in NTU

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Learning Solutions
& Applications

CITS, NTU



**Module 5:
Sustainable Business**

**Module 5:
Sustainable Business**

Intro

This module examines why it is imperative for business organizations to embrace sustainability in order to address environmental challenges faced by their business operations.

It explains what companies can do to reduce their environmental footprint to make their operations more efficient and sustainable. It further explores how business leaders could seize the opportunities to gain competitive advantage through green innovations that differentiate their products and processes from their competitors. There is now a growing demand for increased transparency and accountability from stakeholders.

This module also explains how companies monitor and report their triple bottom line performance.

At the end of this module, you must take a quiz which you must pass (minimum of 11 out of 15 questions correct) in order to proceed to Module 6.

If you cannot pass the quiz at the end of this module, you will be required to take this module again and retake the quiz.

Step 1 of 3
Below are some e...

amplitude
Impulse $\delta[n]$

amplitude
Step Sequence $S[n]$

amplitude
Exponential $S[0.3]^n$

amplitude
Sinusoid $x[n] = 7\cos(\omega n + \phi)$

amplitude
Complex Sinusoid $x[n] = 2e^{j(\omega n + \phi)} = 2\cos(\omega n + \phi) + j2\sin(\omega n + \phi)$

point.

What are the advantages of this system?

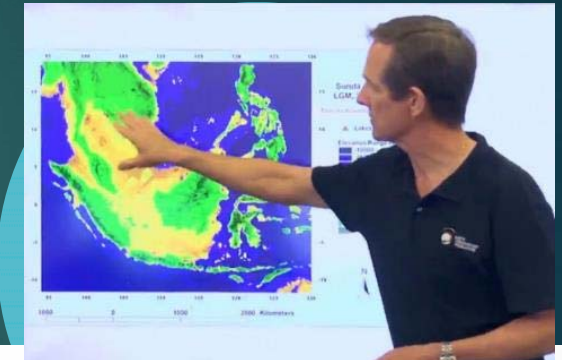
Is it effective?

What are the downsides?

Next Activity

Coverage

- Past/Current TEL Courses in NTU using LAMS
 - Philosophy and Approaches
 - Current Numbers (Front and Back End)
- Feedback and Statistics from Key Courses
- Large Course Implementations
 - Key considerations
 - Learning Moments
- Future Plans



Learning Outcomes

MARGARET LIEN CENTRE FOR PROFESSIONAL SUCCESS

able to:

over letter

so you can

nces at NTU

A portrait of a woman with dark hair tied back, wearing a dark blazer over a black top. She is looking directly at the camera with a neutral expression.

A screenshot of a LAMS (Learning Activity Management System) course page. The page title is "Extrusion". It features a video player showing a man in a white lab coat, identified as "ASSOCIATE PROFESSOR NAM-JOON CHO" from "NANYANG". Below the video, there are sections for "Resources to view" and "Introduction Background Material". The page also includes a "Check for news" button and a "Next Activity" button.

Past/Current TEL Courses using LAMS in NTU

- Before 2012:
 - Beta Testing and Initial Pilots: 2004-2007
 - Ad-Hoc Implementation – Introduction in 2008/2009
 - Faculty DIY effort and asking for advise on ad-hoc basis
 - About 200+ courses with at least 1 LAMS sequence
 - Most will have 1-2 LAMS sequence as part of total eContent in LMS and mostly for eLearning week period.
 - Breadth but not much depth

	AY12/13	AY11/12	AY10/11	AY09/10
No of unique edveNTUre course-sites with LAMS Sequences	270	86	48	97
(Academic Courses only)				
YOY Increase for Academic Courses	210%	79%	-50%	NA

Past/Current TEL Courses using LAMS in NTU

- After 2012:
 - A much more concerted Implementation – Aligned with NTU Education Initiative
 - Learning Solutions Section in CITS project manage and develop TEL courses end-to-end with Faculty
 - Annually, **30 courses of at least 900 hours** of courses committed.
 - Comprehensive, holistic learning design that ensures at least 7-13 LAMS sequences per course
 - Deeper design and in the **next 5 years, more than 1500 courses, with more than 45000 hours of content.**

(Over 60 courses internally per year, with about 100-200 outsourced, per year)

Voting - Google Chrome
lams.ntu.edu.sg/lams/tool/avote11/learning.do?validate=false&dispatch=viewAllResults

Voting results so far

Nomination	Votes
Carbon dioxide	1033 (59 %)
Nitrous Oxide	7 (0 %)
Methane	21 (1 %)
Ozone	8 (0 %)
CFCs	42 (2 %)
All of the above	630 (36 %)

Your nomination is:
Carbon dioxide

- 59% - Carbon dioxide
- 36% - All of the above
- 2% - CFCs
- 1% - Methane

Refresh Change Next activity

Complete with helpful annotations on examples by the lecturer. Finished

MARGARET LIEN CENTRE FOR PROFESSIONAL SUCCESS

Brand Discovery

Skills • Values • Ethics

Philosophy and Approaches

NTU Education Framework

5 Attributes of NTU Graduates:

1. Character
2. Creativity
3. Competence
4. Communication
5. Civic-Mindedness

- Classrooms
- Didactic lectures/tutorials
- Online Learning and eLearning
- Team-based Learning
- Problem-based learning
- Collaborative Learning
- Experiential Learning
- industrial attachment etc...

NTU Pedagogy

- Flipped Classroom
- PBL
- TBL
- CBL
- Inquiry/Dialogue

Online Learning Framework

Sociability

- Collaboration
- Networking
- Experiential on-site
- Participatory discussion

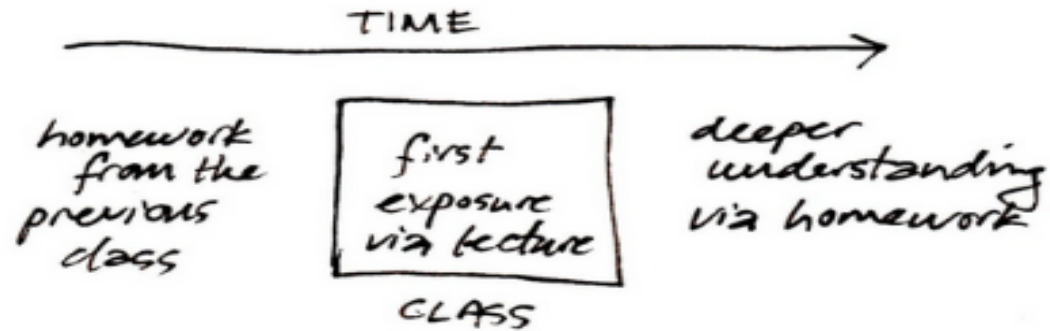
- Social Environment
- Culture
- Academic
- Character Building
- Communication
- Networking
- Sociability
- Collaboration
- Experiential on-site
- Participatory discussion
- Exchange Programme
- etc..

Programmes and Contents

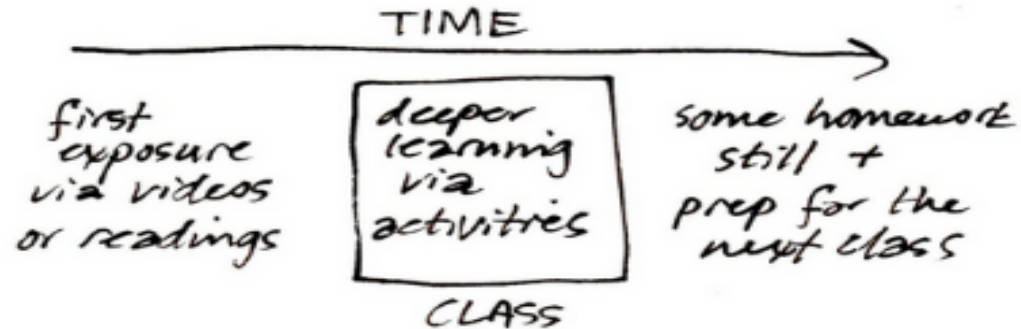
Program Design

Curriculum Re-design

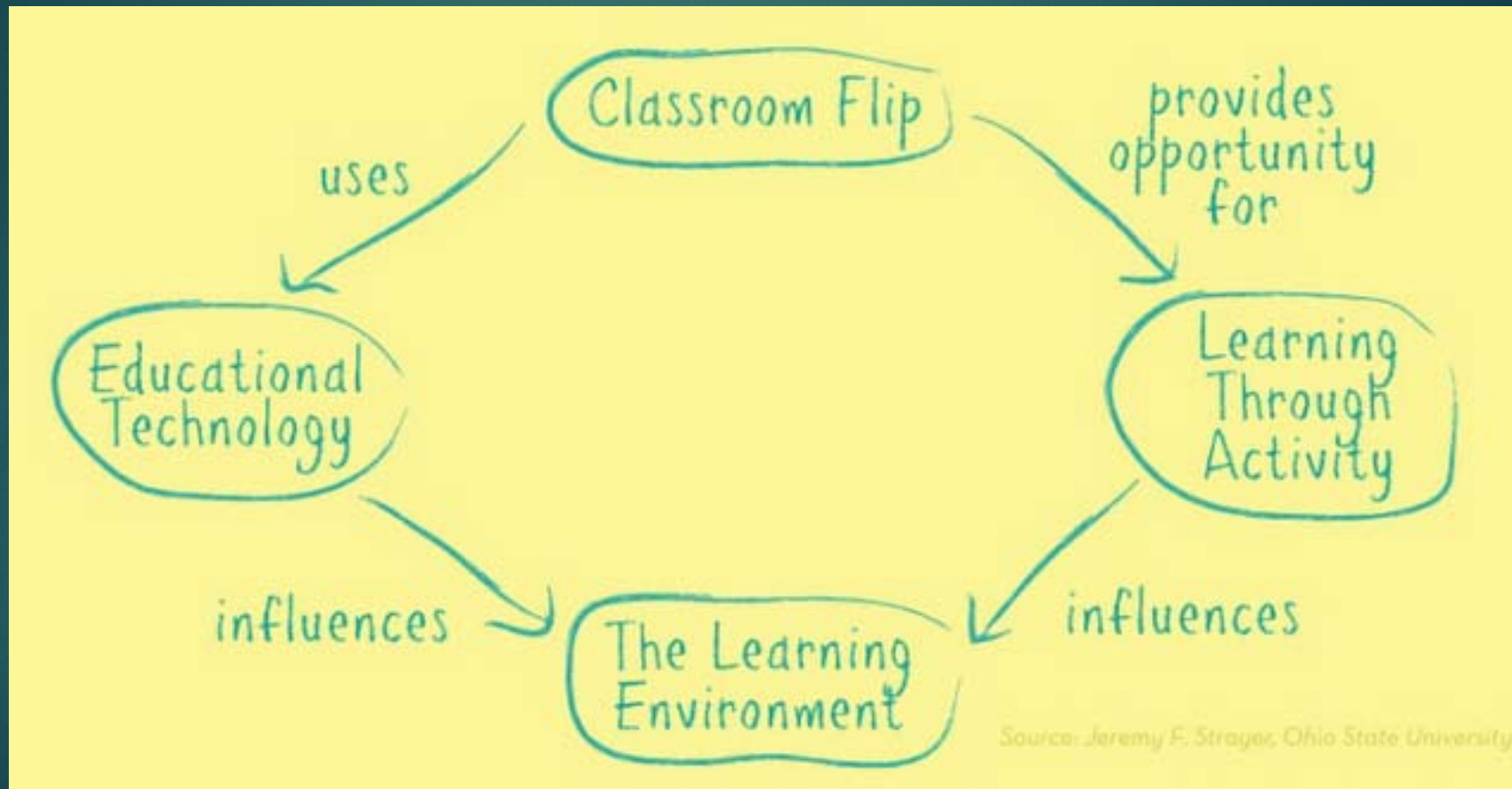
Traditional Classroom:

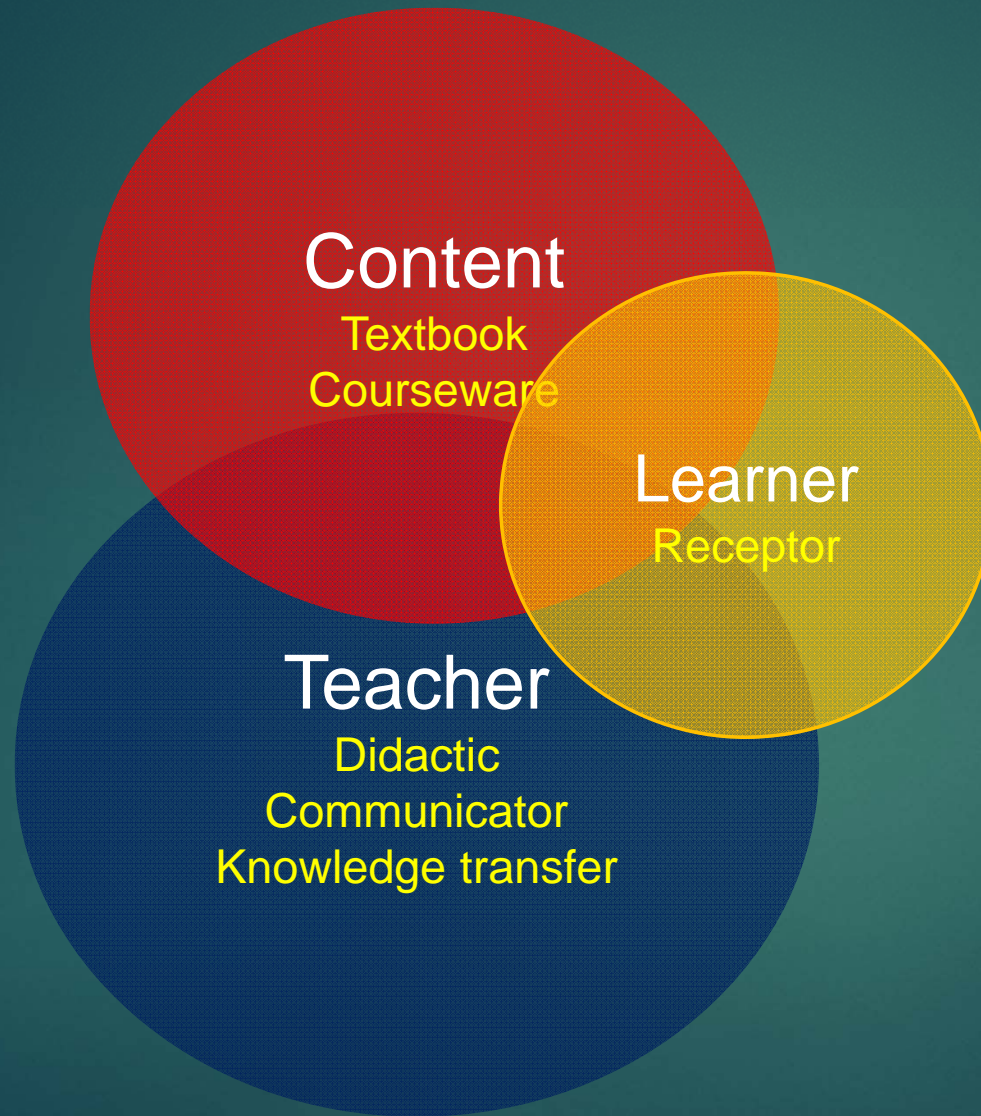


Flipped Classroom:



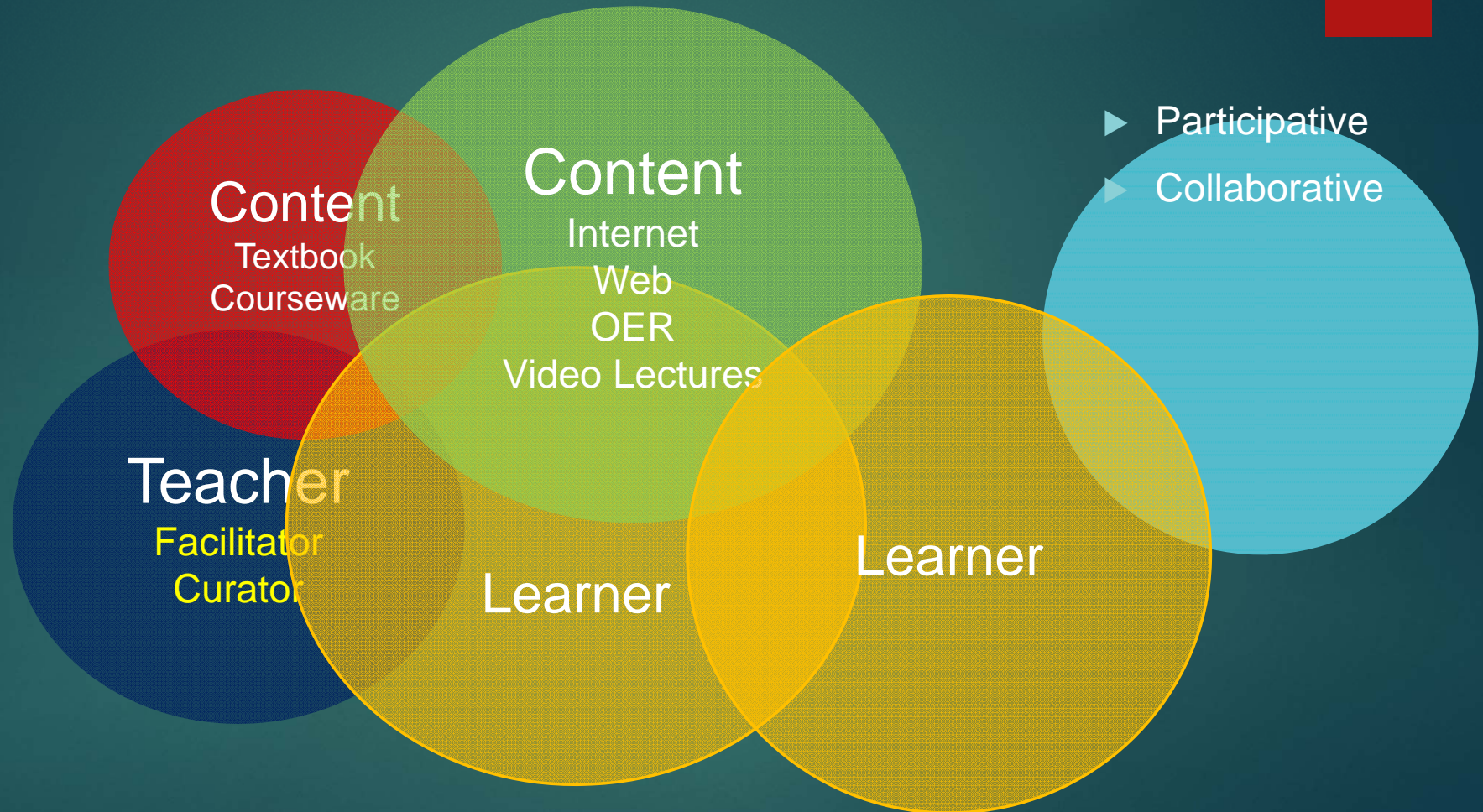
Flipped Classroom





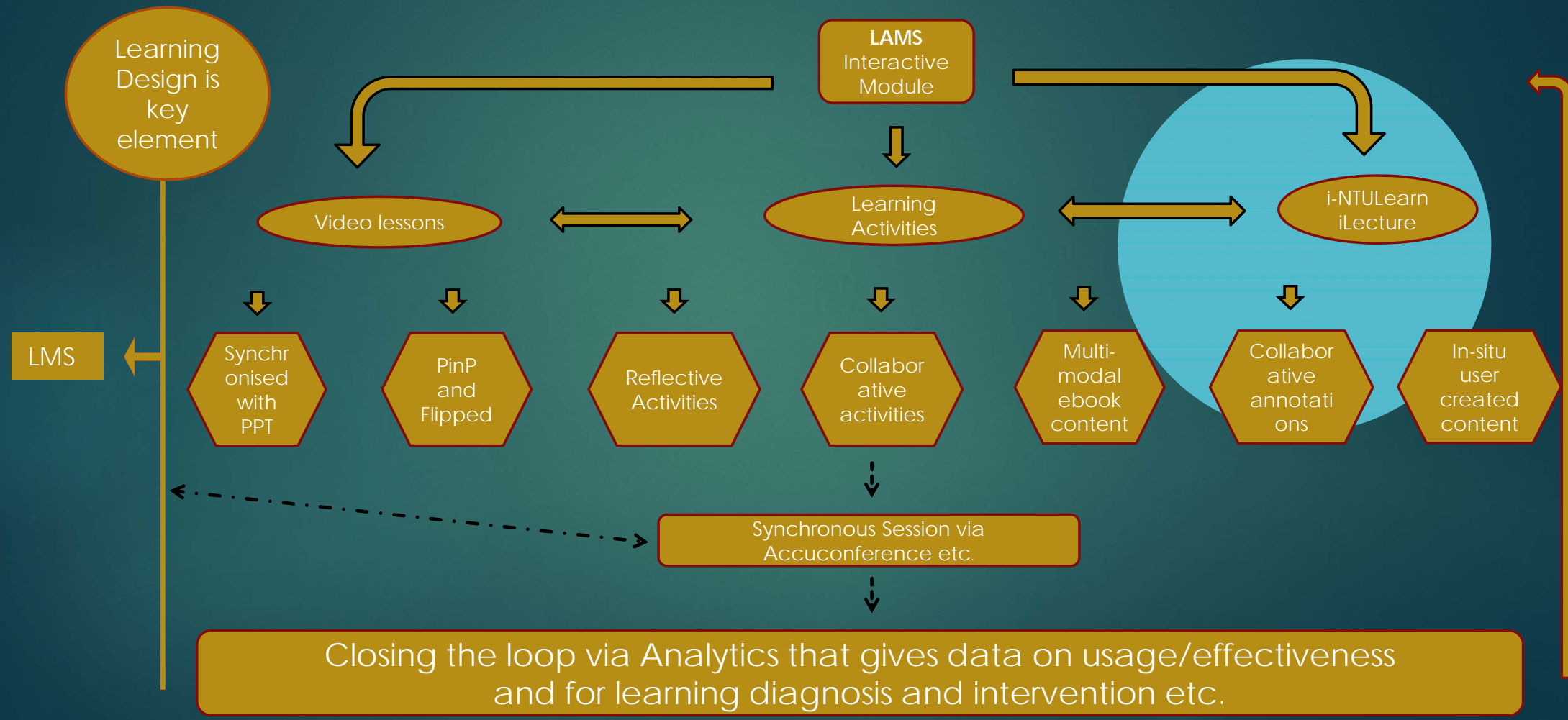
Current/
Previous
Mode of
Classroom
Interactions

Emerging Model



NTU Online Learning Framework

Interface Layer : i-NTULearn. : One-Stop Entry to all Learning Tools



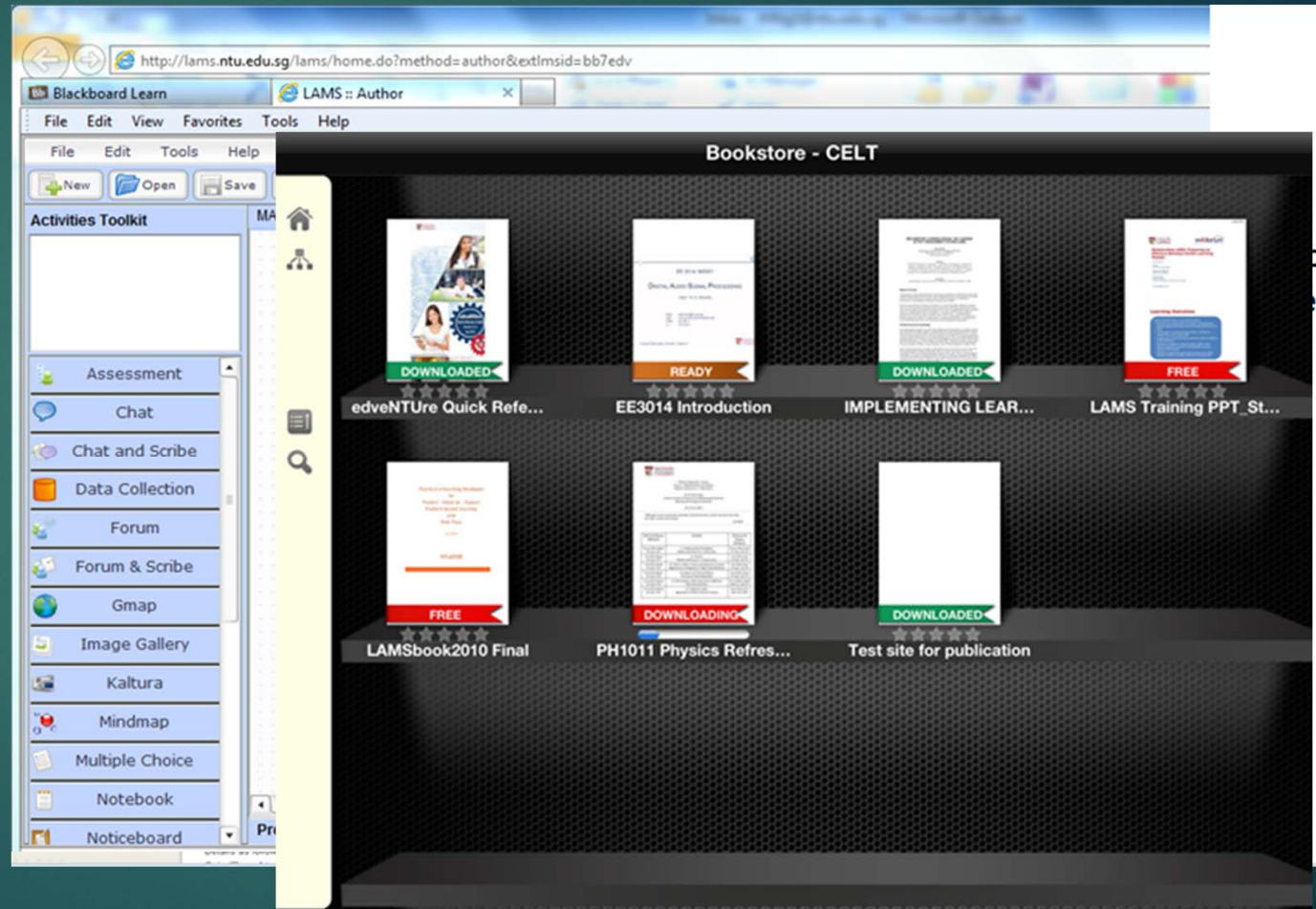
Key Learning Tools\Platform

- NTU Learn

- LAMS

- iNgage

- Mobile Platform
- Offline viewing
- Annotation



Current Numbers (Up to Now)

13

Front End

- From at least 15 different courses: (More than 500 enrollment)
 - Blended learning courses the Part-Time B.Eng. Degree Programme: MAE and EEE currently (SCE in the future)
 - Renaissance Engineering Programme
 - Full-Time Blended Engineering Courses from EEE and NBS

Current Numbers (Up to Now)

14

Front End

- Recently ran Large Class Courses: (Total: More than 3000 enrollment)
 - Core Course on Sustainability (More than 1700 learners)
 - Core Course on Career Basics (More than 1000 learners)
 - Full-Time MAE course converted from the Part-Time Course (More than 500 learners)

Increase of **more than 50% in enrollment numbers** and will continue to increase with 3 more Core Courses and Bridging Courses from Jan 2015, **adding at least another 3000 learners**

Numbers (Up to Now)

15

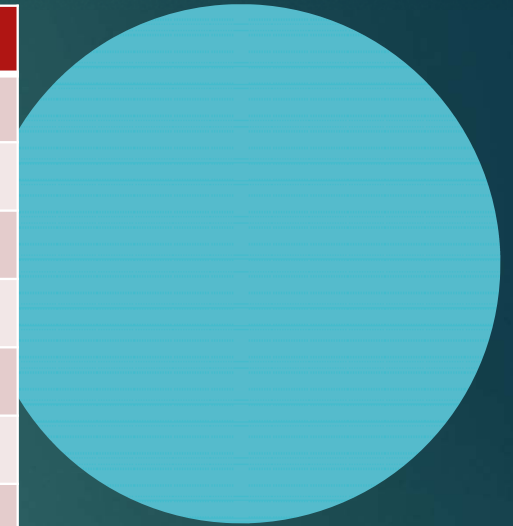
Back End

- Current LAMS setup : 4 server + 1 app server + 1 DB server + Load balancer
- Established workflow between LAMS Front end + Backend + LAMS International
- Contractual agreement between NTU and LAMS – 100 service hours
- Current capabilities – can handle up to 600 concurrent connections (10% of total 6000 learners)

Key Statistics:

16

Courses	Completion rate*
Part Time Module 1	71%
Part Time Module 2	80%
Part Time Module 3	57%
Part Time Module 4	35%
Full Time REP Module 1	89%
Full Time REP Module 2	92%
Full Time REP Module 3	83%



* Completion rate here is akin to finding out what percentage of students who attended lectures, actually completed listening to the lecture, go through the thinking process and did not walk out a quarter of the way, halfway or any parts thereafter.

Survey

17

Specific areas of learners experience	Percentage of respondents agree to the statement
The LAMS modules were easy to access through the LMS	75%
I felt I had enough support to learn to use the LAMS interface	70%
While working through the LAMS modules, the navigation was easy and the instructions were clear	70%
This course provided a flexible learning environment	75%
The lecture recordings were clear and loaded smoothly	70%

Feedback:

Kudos and Reinforcements

18

- ▶ “It allows me to **control** when I feel like learning, making it easy for me to learn as I am able to choose to learn in my **optimal mode**. It also enables me to **engage in questions immediately** after a lecture instead of having to finish the worksheets at home in reality. This makes us remember the content better as it reinforces the stuff twice in one go, so its much **effective** compared to doing the worksheets after reaching home.”
- ▶ “Online learning allows me to **better understand** the topics covered as I can easily return back to the previous module to **refresh** my knowledge and to think about questions raised in the other modules. It is also **flexible** as I can plan my time well to cope with the online learning as well as my other subjects.”

Feedback:

Kudos and Reinforcements

19

- ▶ “I liked the idea of **sharing my comment and thoughts** with my fellow course mate and at the same time **looking at their thoughts**. This allows me to have **diverse understanding of the topics discussed**.”
- ▶ “Through this way, we can listen to the teacher's class more carefully, as we can **choose** to listen as many times as possible.”
- ▶ “I like that the videos are short and direct to the points, with **reflecting questions** that allow me to **recall** what I have learnt.”
- ▶ “Having it done completely online means that I can complete a week's worth of lectures **in less half the time** due to no time being wasted travelling or lecturers wasting time by starting late.”
- ▶ “While LAMS may allow us to have more flexible schedules, **it may also need more willpower and discipline on our part to ensure that we watch the lectures weekly**.”

Feedback:

Improvements and Suggestions

20

- ▶ “Although online learning allows me to learn at my own pace, I would still **prefer traditional classroom learning** as it allows for **more interaction and sharing between the students and the lecturer/tutor.**”
- ▶ “It would be more interesting if there is a session where **students can come together for an online "tutorial group"** to share their opinions with everyone.”
- ▶ “Also, the inability to adjust the **playback speed is very frustrating as many of us often watch the recorded lectures at faster speeds.**”


Feedback:

Improvements and Suggestions

21

- ▶ “Also, this effectively increased the amount of time we need to spend on this topic to 5hours + per week up from 2hours (for lectures). **Perhaps, longer tutorials instead of lectures would be more effective when paired with LAMS, and each tutorial can start with a quick review of the chapter as you have suggested.**”
- ▶ **Lecturers sound unnatural during LAMS recordings** and it is noticeable by students, because speaking to a screen and speaking to a lecture theatre is vastly different

Large Class Implementation: Between 1000-6000 enrollment

- ▶ Core Course on Sustainability – Started in Aug 2014
 - ▶ Core Course on Career Basics – Started in Aug 2014
 - ▶ Core Course on Entrepreneurship – Starting in Jan 2015
 - ▶ Core Course on Ethics – Starting in Jan 2015
 - ▶ Core Course on Engineering Communication – Starting in March 2015
 - ▶ Bridging Course for Physics – Starting in April 2015
- 

Large Class Implementation: Key Considerations

- ▶ In lieu of many Faculty/SME being involved, the authoring tool must be easy to use and flexible:
 - ▶ Support of various pedagogical strategies – branching of activities, POE, Problem based etc
 - ▶ Ease of use for faculty developing the course
 - ▶ Workflow and processes established – Customized ADDIE process
- ▶ Ease of use for students
 - ▶ Orientation briefing
 - ▶ Lams introduction guide and video



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Large Class Implementation: Key Considerations

- Readily available front end and back end support
 - LAMS Ticket through the service desk gets routed correctly and accurately
 - Dedicated backend support team
 - Fast support from LAMS International
- Ease of monitoring by faculty
 - **LAMS monitor**
 - Diagnosis and Learning Intervention
 - Status of Learners
 - Export of Learning Portfolio
- Recyclability of content
 - LAMS Templates

The screenshot displays the LAMS Learner interface. On the left, a navigation pane shows a course structure with modules and activities. The main content area shows a question titled "Question 1: Take time to think about what a tangible outcome would be from an international summit. Write down your thoughts." Below the question, there is a table of answers from other learners, each with a rating and the number of votes.

Answer	Rating
Different countries would have their own interests. It would be very hard if the countries' interests conflict with one another. The outcome would most probably be new guidelines to achieve sustainability.	4.3 / 12 votes
"It allow various countries to come together to address one another's shortcomings. Also, it is possible for a country to offer solutions to make up for another country's shortcomings."	2.9 / 9 votes
"To find out solution about what the difficulties they are facing. -Discuss complex issues with all the people over the world."	3.1 / 4 votes
"A sustainable development without having any effect or minimal effect on the various nations' development. This is something which may be already securing more than other goals and agreements made during international summits are not adhered by all the participating countries in management of haze in ASEAN context. Nevertheless, over the years, small initiatives such as Earth Hour have been quite successful."	3.4 / 4 votes
a tangible outcome could be the reduction of pollution by countries and their firms.	3.1 / 5 votes
Law enforcement to force businesses/corporates to focus on developing projects/items that are more friendly to the earth and to cut down an energy usage and harmful gases emission.	3.2 / 5 votes
"From an international summit, each countries would know the sustainability problem that is happening around the world. For countries that do not have the problem, they could come out with strategies to avoid it and for countries with the problem, they could think of ways to solve it. Besides that, as a saying goes "Two brains work better than one." Thus, an international summit could allow each country to share their specialise to further think of better solutions."	3.7 / 5 votes
"From an international summit, each countries would know the sustainability problem that is happening around the world. For countries that do not have the problem, they could come out with strategies to avoid it and for countries with the problem, they could think of ways to solve it. Besides that, as a saying goes "Two brains work better than one." Thus, an international summit could allow each country to share their specialises to further think of better solutions."	3.5 / 4 votes
International summit may stimulate economic growth.	2.8 / 5 votes
Leaders of all the countries may figure out a common goal and then enforce their respective policies to deal with some serious emergencies currently.	3.2 / 4 votes

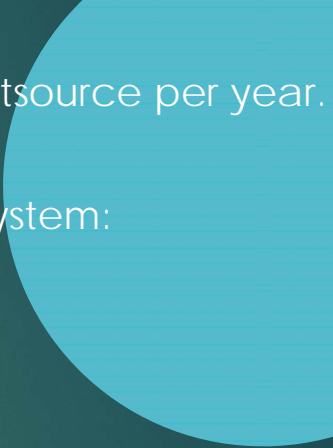
Large Class Implementation: Learning Moments

- ▶ Scalability and Stability – load testing and stress test (RAS)
 - ▶ Load Testing was done for 600 concurrent users
 - ▶ Business logic for specific LAMS sequence must be tested too
 - ▶ Q&A issue for Core Course
 - ▶ Adoption by faculty
 - ▶ Facilitation Strategies during the face to face sessions are important
 - ▶ Linking online and offline activities are key
 - ▶ Mindset change – bad teaching practice brought along to any learning tool will result in similar things
- 

Large Class Implementation: Learning Moments

- ▶ Students' Load
 - ▶ Manage expectations of students re what's expected when going through the LAMS sequence
 - ▶ Majority are ok but some will question the different way they need to learn now
 - ▶ Students must see the value and belief from Faculty too.
- ▶ More Flexibility in terms of other tools integrated into LAMS
 - ▶ Such as video streaming playback capability and download

Future Plans: The NTU 5-Year Roadmap

- ▶ NTU's 5 year roadmap (Learning Environment plans)
 - ▶ 1500 courses over 5 years: 60 courses in house and remaining outsource per year.
 - ▶ [NTU LE](#) seamless integration with LAMS and other tools
 - ▶ More DIY wizards and self-help guide within a user-centric eco-system:
 - ▶ i-NTULearn
 - ▶ LAMS Merger exercise (NTU, LKC, REP)
 - ▶ Merging all LAMS instances into one instance for consistency and also scalability
 - ▶ **LAMS templates on current Interface Layer**
 - ▶ More than 10 different templates which Faculty can make use of
 - ▶ Interface Layer version 1.0
- 

Thank U



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