Priority Areas in ICT in Education
Singapore

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Outline

• Singapore’s plans for ICT in Education
• NIE’s plans for training teachers to use ICT in Education
Need for ICT in Ed Masterplans

• Human capital development – key national focus

• Alignment of economic, manpower & education policies

• ICT in Ed:
  – Preparation for knowledge-based environment
  – Enhance learning experiences

Acknowledgements: *Slides 3 – 11 are courtesy of Dr Cheah Horn Mun, Director, Educational Technology Division, Singapore*
ICT in Ed Masterplan Journey

Masterplan 1
Building the Foundation
1997

Masterplan 2
Seeding Innovation
2003

Masterplan 3
Strengthening & Scaling
2009
Core ICT Training for all teachers

ICT Infrastructure & Support for all schools

Educational software & resources for relevant subjects

1997: Masterplan 1
Building the Foundation

ICT became an accepted tool for teaching & learning
2003: Masterplan 2
Seeding Innovation

Gave autonomy through devolved ICT funds

Baseline ICT Standards for all

Established Baseline ICT Standards for pupils

Baseline ICT Standards for all

FS@SG 5% schs

LEAD ICT Schools 15-20% schs

Remaining Schools

Generate innovative practices through schemes
Examples of ICT use in Schools

Learning language using podcasts

Using broadcast technology for English

Using blogs and e-portfolios to reflect on their learning

Mobile Learning
With PDAs and data loggers

Role-playing in Second Life
Future Schools

• School-based curriculum for engaged learning & 21\textsuperscript{st} Century skills

• School-wide innovation of learning & teaching models using ICT/IDM

• R&D to develop understanding & depth

• Partnership with industry
# Orientation of the Innovation – Intended Outcomes

<table>
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<tr>
<th><strong>Curriculum 2015’ Student Outcomes</strong></th>
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<tr>
<td><strong>Confident Person</strong></td>
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<td>Thinks independently</td>
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<td>Communicates effectively</td>
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<td>Has good inter-personal skills</td>
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<td><strong>Self-directed Learner</strong></td>
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<td>Takes responsibility for own learning</td>
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<td>Questions, reflects, perseveres</td>
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<td>Uses technology adeptly</td>
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<td><strong>Concerned Citizen</strong></td>
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<td>Is informed about world and local affairs</td>
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<td>Empathises with and respects others</td>
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<td>Participates actively</td>
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<td><strong>Active Contributor</strong></td>
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<tr>
<td>Exercises initiative and takes risks</td>
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<td>Is adaptable, innovative, resilient</td>
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<td>Aims for high standards</td>
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**mp3 Goal**
Students develop competencies for **self-directed and collaborative learning** through the effective use of ICT as well as become **discerning and responsible ICT users**

**2009: Masterplan 3**
**Strengthening and Scaling**
Professional Development

The projects under the strand are:

ICT-PD Framework
An ICT-PD Framework has been developed to define the respective roles, responsibilities and a corresponding set of competencies (knowledge and skills) for the different groups of school personnel implementing the use of ICT in schools. The framework aims to guide MOE HQ and schools in the planning and development of various mp3 professional development programmes, as well as help schools understand how the roles of the different school personnel contribute to actualising the various mp3 goals. This framework was released to schools in early 2010.

ICT Mentors
To cascade effective ICT practices in and across schools and to raise the level of ICT use in schools, a group of ICT Mentors will be developed. The training of ICT Mentors will be implemented in 6 phases from 2010 – 2012. These ICT Mentors will serve as mentors to teachers on ICT use for learning and teaching in their respective disciplines. They provide requisite knowledge on planning and delivering ICT-enriched learning experiences, champion best practices, and facilitate the sharing of ICT resources created by teachers to propagate good ideas and practices.

Consultancy and Support for Schools
MOE will continue to provide ICT consultancy and support to schools through customised professional development programmes and teacher work attachments. It also establishes sharing platforms, such as annual educational technology conferences, to promote the sharing of good ICT practices among schools.

Recognition Programmes for Teachers
To recognise the innovative practices of teachers, award programmes such as the School Digital Media Award for Teachers are in place to facilitate the sharing of good practices among the community of teachers.

Source: The ICT Connection [http://ictconnection.edumall.sg]
Lessons learnt

1. The need to bridge the gap between ICT competencies and effective teaching

2. The need to balance between centralisation and autonomy
Necessary Transformation

1st Masterplan: Build Foundation
- ~ ICT supporting curriculum
- ~ Core training for all teachers and school leaders
- ~ Spearheading R&D efforts in collaboration with industry & schools
- ~ Central provision to equip all schools
- ~ One-size-fits-all

2nd Masterplan: Seed Innovation
- ~ ICT integrated into curriculum & assessment
- ~ Differentiated Prof Development
- ~ Consultancy to school leaders
- ~ Seeding innovation in schools
- ~ Flexible provision to suit schools needs

3rd Masterplan: Strengthen & Scale
- ~ ICT embedded into syllabuses & teaching guides
- ~ ICT Mentorship
- ~ Professional Learning Communities
- ~ Translating research to influence classroom practices
- ~ Closer alignment to curriculum changes and schools needs
On research: Crossing the chasm in education

“Most research projects fail to cross the chasm, and though they may yield valuable knowledge about the nature of cognition, teaching & learning, and therefore inform the research community, they do not have a broad or lasting impact on mainstream K-12 education” (Fishman, 2005)
Towards a framework

• “Centralized” is one of the characteristics of educational scaling in Singapore
  – The government has a strong presence in enacting directions/policies, taking initiatives, and playing driving forces.
  – The agents in centralized scaling are assigned (top-down) or motivated (bottom-up) to spread certain innovations for certain outcomes, purposes or themes

• There is no pre-defined or definite central theme in “decentralized” scaling model
  – to make all the agents united together, with competition and symbiosis for different scaling themes or factions

• “centralized” and “decentralized” are more scaling purpose- or outcome-oriented.

• “top-down” and “bottom-up” are more scaling methodology- or process-oriented
Implementation:
Centralized or de-centralized?
Top-down or bottom-up?

Centralized Top-Down

Centralized Bottom-up

Decentralized Top-Down

Decentralized Bottom-up
Centralized top-down scaling

• Driven from the top
• Defined key constructs like SDL and CoL
• Top-down strategies
  – E.g. ICT champions, ICT Mentors, baseline ICT standards for students, Future Schools 1.0
• Different levels of prescriptiveness
• Different types of disseminations
  – Workshops, materials, MOE HQ staff as resources, etc
Centralized bottom-up scaling

• Tagline: **top-down support for bottom-up innovations**

• Policies to encourage innovations
  – Set directions
  – Provide resources, funding
  – Aggregate lessons learned from implementation to iterate the innovation and support for the innovation

• Examples
  – For FutureSchools 2.0, invites proposals from schools to be Future Schools
  – Researcher-driven projects
  – School-driven projects
    • they can apply for funding from eduLab programme
De-centralized bottom-up scaling

• Agency really from the ground (grassroots)
• Build up constituency
• Collaboration with industry partners
  – e.g. driven by technological or business initiatives
National Institute of Education
in teacher training
Needs and challenges

• Preparing teachers relevant to current and future needs
• Value-based education
• Teaching digitally savvy students
• Teachers as learning designers
• Preparing 21st century skills
ICT For Meaningful Learning: Training of Pre-Service Teachers
Background

- Pre-service level
- Ballpark of 1500 to 2000 student teachers per year
- First year core module
Brief History

• Trajectory taken in the last decade characterized by:
  – Skills-based
  – Technology-integrated
  – Knowledge creation with Web 2.0

• Major influences include:
  – National ICT policies
  – Harnessing the learning sciences to focus on nature of learning
  – Using Web 2.0 to build a participatory culture
## Brief History

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<th>Skill-based</th>
<th>Technology-integrated</th>
<th>Knowledge creation with Web 2.0</th>
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<tr>
<td><strong>Student teachers competencies</strong></td>
<td>Instructional design</td>
<td>Knowledge of a suite of tools</td>
<td>Web 2.0</td>
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<td>Learner-centered lesson packages</td>
<td>Learner-centered lesson ideas &amp; artifacts</td>
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<td><strong>Tools used in NIE</strong></td>
<td>LMS</td>
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<td>E-learning hub</td>
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<td>Discussion forums</td>
<td>Google products</td>
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<td>LMS</td>
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<td><strong>Pedagogical Approaches</strong></td>
<td>Lecture</td>
<td>Faculty modeling</td>
<td>Reciprocal Teaching</td>
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<td>Self-directed learning</td>
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<td>Collaborative learning</td>
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<td>Faculty modeling</td>
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Examples of learner-centered lesson packages:

- **QED522: ICT for Engaged Learning**
  - Problem Based Learning – Student-Centered Learning Package
  - “What Kills Hee, Acids or Bases?”

- **BANK ROBBERY!**
  - Put your factual recount writing skills to the test!

- **Singapore’s Road to Independence**
  - 1965 Separation from Malaysia
Course Objectives

ICT for Meaningful Learning:

• To appreciate the potential of ICT tools
• To build competencies in the use of specific tools
• To prepare for implementation of IT-based meaningful learning activities in classrooms
Major Highlights of Course

• Core and customized structure (TELs) to cater to learning needs
• Opportunities to experience ICT tools
• Various opportunities to practice teacher as designer
• Flip classroom approach
Meaningful Learning Framework

• 5 dimensions of meaningful learning

- Engaging prior knowledge
- Collaborative learning
- Learn by doing
- Self-directed learning
- Real-world context

Examples of Students’ Use of Web 2.0

• Example 1 – In Defense of Singapore (Fakebook)
  – Secondary 2 History lesson
  – Objective: Demonstrate historical imagination through creating a historically plausible conversation between historical actors on a historical issue through Fakebook
  – Students are to study a model teacher-created Fakebook profile of Lee Kuan Yew on the government’s decision to enact compulsory conscription in 1969
  – Collaborative Learning:
    • Historical topic to represent
    • How best to represent the diverse perspectives of historical actors in Fakebook
Examples of Students’ Use of Web 2.0

- Example 2 – Food Resources – Is technology a panacea for food shortage (Wix)
  - Secondary 3 Geography lesson
  - Objective: Create a mindmap to show the locational links between the final food and the breakdown of the different ingredients that are used to make it.
  - Real world context:
    - Real-world object, i.e. can food
    - How food is exported globally and how this affects people and one’s diet
Thank you!

website: http://gs.lsl.nie.edu.sg/profile/LCK/
cheekit.looi@nie.edu.sg
Mainstreaming ICT-enabled innovation for learning in Europe

Exploring conditions for scalability and sustained impact at system level

An overview of the study "Up-scaling Creative Classrooms in Europe" (SCALE CCR) conducted by the Joint Research Centre, Institute for Prospective Technological Studies on behalf of the DG Education and Culture (Dec 2011 - Jun 2013)

1. The challenge
How to make ICT-enabled innovation for learning sustainable?
How to reach a significant scale and systemic impact?

2. The approach
Need for a systemic approach and changes at organisational, technological, & pedagogical level for the sustainable implementation and replication of Creative Classrooms. Creative refers to innovative practices, while the term classroom includes all types of learning environments, formal and informal settings.
Focus on what is possible in today’s structures with today’s technologies.

3. The research cycle

4. 7 cases of ICT-enabled learning innovation from Europe & Asia*
- e-learning for developing teacher knowledge in Europe
- digital platforms for developing digital skills of students in Asia
- e-learning for solving public education in Japan
- e-learning for face-to-face learning in Europe

5. Mapping & analysing the 7 cases
- through the five-dimensional framework of ICT-enabled innovation for learning
The SCALE CCR report on ICT-enabled innovation for learning in Europe and Asia is now available online at http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=6362
The spider framework (European Commission, 2013)
Innovative pedagogical practices

- Content & Curricula
- Leadership & Values
- Organization
- Teaching practices
- Assessment
- Infrastructure
- Connectedness
Key findings of EC report: Common characteristics of successful ICT-enabled learning innovations

• They have been developed 'organically' over time (ecological model of change)
• They follow top-down strategies for supporting bottom-up innovations
  – Role of researchers and industry as meso-level actors
• They provide architectures for self-organized learning across sites and levels
Key findings of EC report: Common characteristics of successful ICT-enabled learning innovations

• They facilitate shared ownership for continuous innovation and sustainable change at many levels
• They enable leadership strategies for strategic alignment
• They foster multilevel, system-wide connectivity and strategic partnerships
• =>
• Roles of government, funding agencies, industry, researchers, practitioners
Our motivation:
Crossing the chasm in education

“Most research projects fail to cross the chasm, and though they may yield valuable knowledge about the nature of cognition, teaching & learning, and therefore inform the research community, they do not have a broad or lasting impact on mainstream K-12 education” (Fishman, 2005)
comments on educational reforms ... at what levels are they occurring?
Perspectives to educational reforms and innovations in schools

• Macro-level:
  – Policy makers set desired broad education policies and outcomes
  – provide infrastructure, framework and support

• Micro-level
  – School teachers interpret such policies and implement practices based in their own interpretations
Perspectives to educational reforms and innovations in schools

• Macro-level:
  – Usual assumption: structural determinism

• Micro-level
  – More organic kinds of adaptations and responses

• Gap between broad intent of policy makers and what actually gets implemented at the ground-level
What mediates the interactions of these 2 levels?

• Meso-level actors
  – School leaders
  – University researchers
  – Industry players

• Interpret education policies & desired intents at macro-level

• Provide workable models that embody the policies to schools
Back to example of Singapore as a nation seeking systemic reform in the integrated use of ICT in the schools