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Transforming Teaching & Learning Interactions Through ICT

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Overview

- Introduction: Desired Outcomes
- Key Components of holistic approach:
 - Human Resource Infrastructure
 - Physical Infrastructure
 - Supporting Environment
- Tools: Using ICT for Teacher Preparation
- Looking Ahead: IDM & Challenges



What do we want?

- All learners:
 - Continual learning mindset
 - Spirit of innovation & entrepreneurship

- Environment:
 - Networked – ‘free’ flow of information
 - Immersive – ‘virtually’ engaged
 - Abundance of learning opportunities

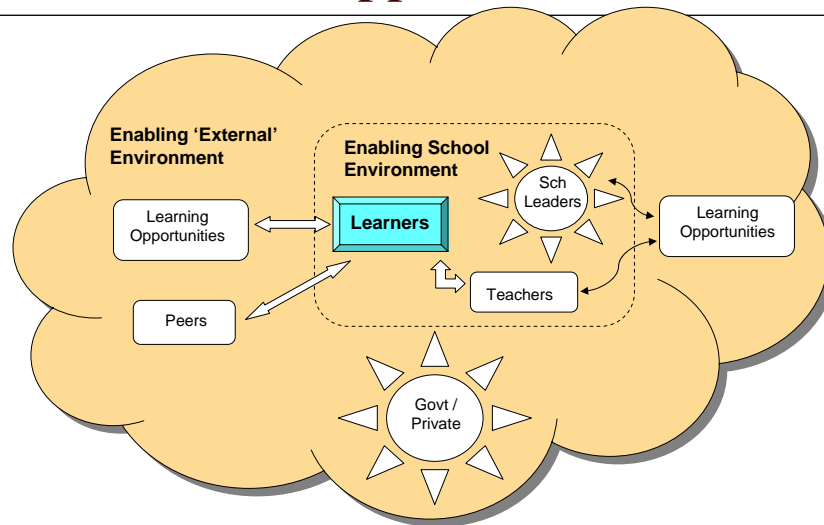


What does it mean in Education?

- Pedagogical innovation
 - Development of ICT-enabled Teaching & Learning Interactions

- Multi-prong approach
 - Human Infrastructure
 - Physical Infrastructure
 - Enabling Environment

Overview of Approach



Government Initiatives

- Nation: Aim – build infrastructure recognizing IT/ICT as key to economic development
 - IT plans
 - iN2015
- Education:
 - MP1: Foundation
 - MP2: Beginning to transform T&L interactions
 - MP3 – coming on board

National IT Plans

- 1st IT Plans – 1980
 - Computerize major Ministry functions
 - Facilitate growth of IT industry & IT Manpower
- 2nd IT Plans – 1986
 - Integrating computing & communications, One-stop services
- 3rd IT Plans – 1991 (IT2000)
 - Transformed into wired, networked & intelligent island
- 4th IT Plans – 1996 (InfoComm21)
 - ICT for 'new' economy
 - Participation of private sector – easing of policies etc



iN2015 (intelligent Nation 2015)

- 10-yr Masterplan launched in June 2006
- Vision:
 - **Innovation**
 - Fuel creativity and innovation among businesses and individuals by providing ICT platform that supports enterprise and talent.
 - **Integration**
 - Connect businesses, individuals and communities, giving them the ability to harness resources and capabilities.
 - **Internationalization**
 - Conduit for providing easy and immediate access to the world's resources and position Singapore in the global markets.

iN2015

□ Goals:

- Top in harnessing infocomm to add value to the economy and society
- 2-fold increase in the value-add of the infocomm industry
- 3-fold increase in infocomm export revenue
- Create 80,000 additional jobs
- Achieve 90% home broadband usage
- Achieve 100% computer ownership in homes with school-going children

iN2015

□ Strategies:

- spearhead the transformation of key economic sectors, government and society through more sophisticated and innovative use of ICT
- establish an ultra-high speed, pervasive, intelligent and trusted ICT infrastructure
- develop a globally competitive ICT industry
- develop an ICT-savvy workforce and globally competitive ICT manpower



IT Masterplan for Education 1

- Allocated \$2b over 5 yrs (1997-2002)
- Focused on raising baseline level:
 - Curriculum & Assessment
 - Content & Learning Resources
 - Physical & Technological Infrastructure
 - Human Resource Development
- Implemented in three phases
- Achieved:
 - Pervasive IT Infrastructure & provision
 - Raised teacher IT capacity – skills & pedagogy



IT Masterplan for Ed 2 (2002-7)

- Go beyond putting computers in classroom – build on foundation of MP1
- Main focus:
 - IT in Curriculum & Assessment
 - Professional Development
 - Capacity & Capability Building
 - Research & Development
 - Infrastructure & Support
- Shift to greater autonomy for schools

MP2 (2002-7)

□ Envisaged transition:

Today	Tomorrow
Use of IT to support existing curriculum	Seamless integration of technology at the planning stage of curriculum design
Largely static content in print form	A repository of dynamic digital content
One size fits all approach	Mass customisation and ability-driven approach
Teachers demonstrate basic skills and competencies in using IT for teaching	Teachers demonstrate a range of competencies in using IT for teaching
Phased implementation of technology in schools	Greater ownership and accountability in technology implementation for schools
Standard technology provisions for all	Flexible technology provisions for all
Predominantly practising teacher-centred pedagogies	Predominantly practising pupil-centred pedagogies

MP2 (2002-7)

□ Key Initiatives:

- Baseline ICT standards for pupil learning
- LEAD ICT@Schools Scheme:
 - Engaged in ICT R&D to improve teaching & learning
 - Implement innovative/effective pedagogies at least 1 subject across 1 school level
- R&D support:
 - Ed Tech Division help form strategic partnerships & do environmental scans





Teacher Capacity Building

- Pre-Service:
 - ICT skills – prior to start of program
 - Core course on ICT integration
 - 6-12 hrs ‘using ICT to teach’ in all curriculum areas
 - Exposure to advance ICT pedagogies, e.g., Classroom of the future
 - ICT integrated curriculum development capability – e.g., microLesson
 - Meet baseline ICT standards



Teacher Professional Development

- Masters program – ICT integration
- R&D engagement, especially action research involving ICT, eg. Knowledge forum
- Formation of learning communities via ICT
- Support for ICT pedagogy innovation
- Time-tabled time for teachers

Teacher Trainer Capacity Building

- Three focal points to drive ICT:
 - ACIS – infrastructure & support
 - e-Learning committee – ICT engagement efforts
 - R&D in ICT – Learning Sciences Laboratory
- E-Learning weeks
 - Instructional design & facilities support
- Measures to encourage ICT engagement
 - Funding to support development of materials
 - One e-champion per department
 - Lessen workload
- Mixed of online, face-to-face & blended courses



School Leaders

- Key to overall ICT development & adoption in school – defines culture & practices
 - Establish commitment
 - Spirit of innovation & creativity
- ICT leadership
 - IT Head of Department
 - IT resources & pedagogical support

School Leaders



- School leadership:
 - Raise awareness – focus on exposure
 - Effect mindset changes
 - Schools given autonomy to chart own path in the use of ICT – got to manage annual IT grants
 - Ed Tech Div provides framework to support planning – tech planning kit plus IT management kit

- NIE
 - Integrate ICT modules within leadership programmes – MLS & LEP
 - Immersion in ICT-enriched environment

Tools: Blackboard

- Basic LMS for all NIE student teachers

- Key features for teaching & learning:
 - Online materials (static & interactive)
 - Discussion board & Quiz
 - Digital boxes
 - E-portfolio: blogs, website, content

- All courses on LMS

- Provided through NIE portal

Tools: MicroLesson

- ICT-based instructional materials for specific topic
- Incorporation of a variety of pedagogies
 - Resource-based
 - Problem-based
 - Case-based
 - Collaborative
 - Simulation-based
- Only use easily available software
- [Demo \(template\)](#)

Tools: Learning Objects

- Small electronic units of educational material that are flexible, reusable, customizable, interoperable, retrievable
- Centre to support creation. Covers Math, Science, Geography, EL etc.,
- Examples:
 - interactive video for bio-mechanics
 - Applets to enhance understanding of physics concepts

Tools: Application Support

- Available for staff & students:
 - Audacity
 - BrainPOP
 - Hot Potatoes
 - MS Producer
 - NIEShare
 - PEP 2.0
 - Photo Story 3
 - Quandary
 - SoftChalk LessonBuilder

Tools: e-Portfolio

- Repository of learning materials developed as part of pre-service courses, e.g., videos, flash objects, applets etc.
- Incorporated as part of course requirements in selected modules
- Usage include presentation, wiki, blogs, multimedia materials, lesson plans, etc.

Tools: Games

- National Education – social interaction game to explore decision-making in the context of hypothetical nation-building
- Ideal force – a physics game for clarification of misconception relating to projectile motion
- 2nd Life – exploration stage

Tools: Knowledge Building

- Production & continual improvement of ideas
- Ideas treated as ‘real’ objects of inquiry
- Principles applied in selected modules (pilot)
 - Student-initiated investigations
 - Collaborative group work
 - Teacher guides students towards deeper understanding
 - Use of ICT for idea improvement



Tools: NIE Wiki

- Exploring the use of Wiki for learning:
 - Development of lesson plans
 - Construction of learning theory concepts (process enhances understanding)
 - Development of classroom management ideas
 - Development of teaching approaches



Tools: Classroom of the Future

- Demonstration of potential ICT-enriched pedagogies
- Serves to transform mindset of learners
- Provoke generation of ideas for effective use of ICT
- All student teachers exposed to environment

Tools: Others

- ❑ Data loggers
- ❑ Robotics
- ❑ eGrammer (learning objects)
- ❑ Geomorphology (online resource & guide)
- ❑ Hydrology (Learning objects)
- ❑ Gym1 (3-D models for learning gymnastics)
- ❑ Digital Lectures
- ❑ Virtual Mineral Lab (Online Geography experiment)

Looking Ahead

- ❑ 3 ICT levels of learner engagements
- ❑ Efficiency
 - No real change in pedagogy
- ❑ Transformational
 - New ICT-enable pedagogies
- ❑ Rich learning outcomes (IDM)
 - Immersive learning, outcomes 'uncertain'

Issues & Challenges

- 3 early challenges
 - Pace of ICT development
 - Increasing connectedness
 - ICT skills essential for KBE

- Fundamental ways for communicating has 'stabilized'

Issues & Challenges

- Human Resource Capacity
 - Balance between adoption pace and tech learning capacity
 - Effective use of ICT for teaching & learning

- Physical Infrastructure Development
 - Baseline needs
 - Keep pace with ICT Teaching & Learning interactions
 - Flexibility for user defined interactions

Issues & Challenges

- Leadership preparation
 - Sufficient & timely exposure to new ICT
 - Requires concerted efforts

- Support & Resources
 - Driven by pedagogical needs

- ICT in Education R&D
 - Requires critical mass of teacher researcher

Suggestions

- Research into the development of pedagogies taking into account emerging technologies
- International cross-cultural studies of ICT effectiveness in teaching and learning
- Partnership in jointly developing technologies for teaching and learning
- Collaboration on projects amongst students from various schools (locally and internationally)
- Joint conferences and workshops for sharing experiences in the use of ICT in teaching and learning



Thank you