

Seamless Learning with Mobile Technologies: Perspectives from Singapore

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- Policies and practices on ICT in education in Singapore
 - MasterPlans for ICT in education
 - FutureSchools@Singapore
 - Edulab Programme
- Research in seamless learning with Technologies



MasterPlan on ICT in Education I, II & III

Vision for the use of IT in education

Launched in 1997

Prepare students for 21st Century

Conceptual Framework for mp2



Strengthening & Scaling



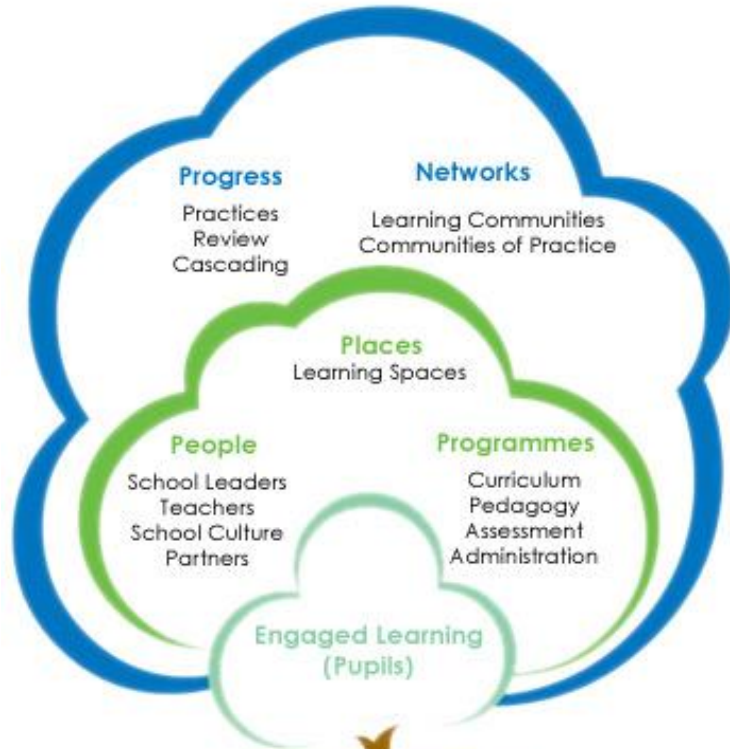
Seeding Innovation



Building the Foundation



FutureSchools@Singapore



- Highly-Motivated digital learning life style
- Anytime, anywhere learning
- Enhanced knowledge construction and skills development
- Enhanced collaboration at local, national and government levels
- Enhanced participation by all education stakeholders



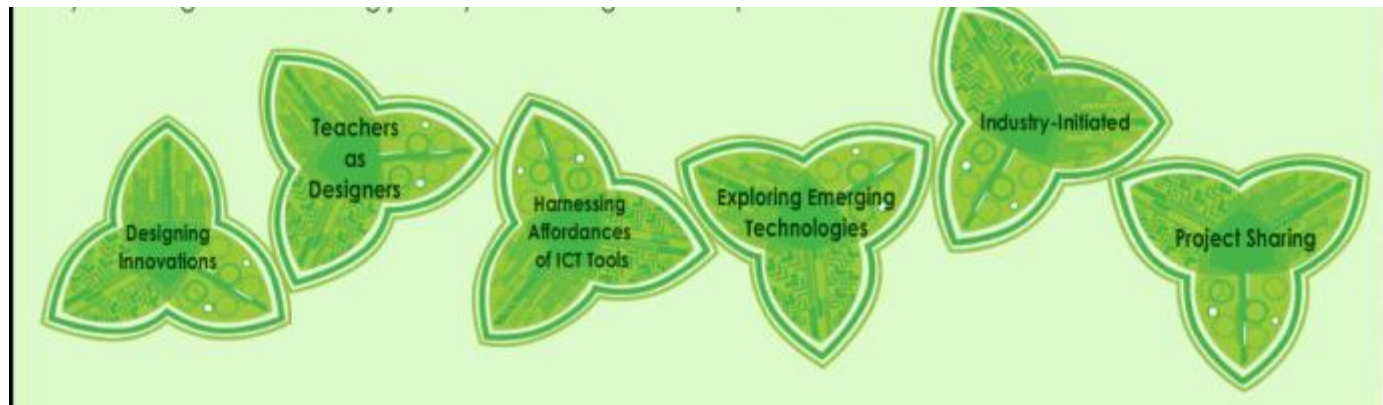
Founded 1947

南侨小学

NAN CHIAU PRIMARY SCHOOL

EduLab Programme (Seed, Scale, Sustain)

- Objectives: bringing ideas to practice
 - Foster ideation and collaboration in experimenting with technology in education
 - Promote adoption of successful use of technology in education
 - Provide ICT infrastructure to facilitate technology experimentation with schools and MOE HQs to assess potential solutions prior to adoption
- Multi-party collaboration approach



Where I am coming from?

- 1:1 m-education is experiencing exponential growth.
- Many 1:1 initiatives are not sustainable.

The New York Times

Education

Seeing No Progress, Some Schools Drop Laptops



New York Times, May 4, 2007

Education in Peru: Error message
A disappointing return from an investment in computing

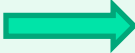
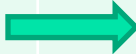


The Economist, April 7, 2012, "children receiving the computers did not show any improvement in maths or reading. Nor did it find evidence that access to a laptop increased motivation, or time devoted to homework or reading"





Why did this happen?

- Focus on device instead of teaching and learning
- The device is supplemental for students' learning
- Lack good pedagogical model

Paradigm Shift

Device Centric		Content Centric		Student Centric
Learn about Technology		Learn from Technology		Learn with Technology

- continuity of the learning experience across different scenarios or contexts
 - between formal and informal contexts
 - between individual and social learning
 - between physical and digital worlds
 - across time and locations
 - multi-modality
 - Ubiquitous knowledge access, synthesis and creation
- one device or more per student

Out Class	<p>Type II Planned learning out of class E.g. Field trip to heritage site which is part of a school curriculum</p> 	<p>Type III Emergent learning out of class E.g. Using mobile phones to capture pictures and video clips of animal and directed by self-interest</p> 
In Class	<p>Type I Planned learning in class E.g. Searching for answers in the classroom</p> 	<p>Type IV Emergent learning in class E.g. teachable moments not planned by the teachers</p> 
	Planned	Emergent

Lesson Example 1: Project 3Rs

- **Curriculum:** Environmental issues
 - Project 3Rs: Reduce, Reuse, Recycle
- **Pedagogy:**
 - Challenges-Experiential learning (Bransford, et al, 2000Kolb, 1984)
- **Approach**
 - mobile application to scaffold deeper learning



3Rs: Mobile Learning Activity Design



Activity 1: Packaging

Activity 1: Packaging ◀ 9:20

Product

Brand

Type of Packaging

Comment

Save Exit

3Rs - Experience ◀ 9:20

Take photo

Help

Activity 2: Use of plastic bags

Activity 2: Storage Bag ◀ 9:20

No. of customers were served?

No. of customers using reusable bags?

Estimate the No. of plastic bags used?

Comment

Save Exit

Activity 3: Customer interview

Activity 3: Interview of ◀ 9:20

Q1. Do you bring your own shopping bag when you go to the supermarket?

Yes No

Comment

Main Next

3Rs - Experience ◀ 12:29

Activity 1

Activity 2

Activity 3




Main Reflection

Help

Challenge:

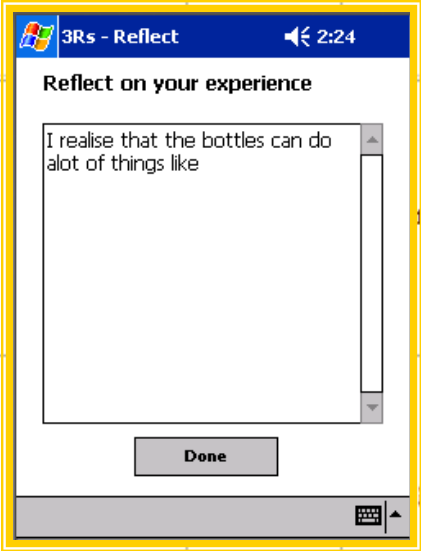
we will have less fresh water, trees and sea creatures will die and more heat will enter the Earth.

Activity 1:

No of Activity	Product	Brand	Type	Comment	Picture
1	biscuits	kraft	Paper	it is made of paper.	
2			Plastic	they need	
3		guan	M		

Data from Activity 1 with pictures taken of packaging

Response to the challenge presented to pupils



Data from Activity 2 on usage of plastic bags

Activity 2:

No of Activity	No. of customers were served?	No. of customers using reusable bags?	Estimate the No. of plastic bags used?	Comment
1	9	1	16his is 16	This is the express lane.

- Learning effectiveness

Paired-sample *t* test of Students' Understanding on 3Rs

	Mean	S. D.	t	Cohen's d
Pre-Test	1.95	2.05	-7.858**	.95
Post-Test	4.07	2.35		

Note: ** $p < .01$



- Role of mobile application

- To scaffold seamless learning (type I – II) through the Challenges-Experiential Cycle
- To collect data
- To capture students' thoughts
- Enable collaboration by comparing, contrasting and peer commenting
- Easily adapted to other topics

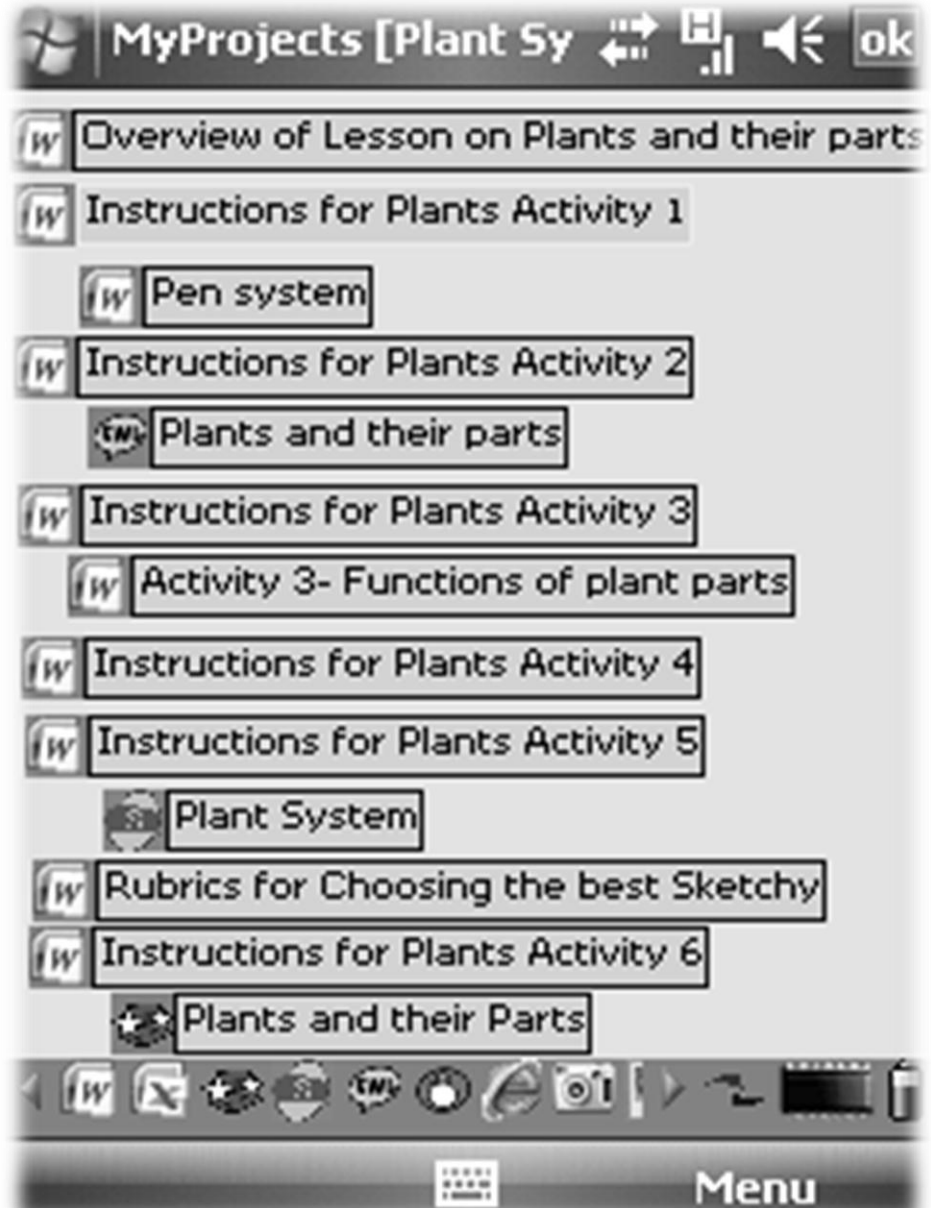
Example 2: Science – Plant System

- Pedagogy
 - Inquiry-based learning
 - Multi-modal learning



- Approach
 - mobilize whole curriculum.
 - Mobile device as a learning hub

Plant System: Activity Design



Plant System: Activity Design

- your parts, you will be required to do the following:
1. Identify and explain what is a system
 2. Identify and state the functions of different parts of plants e.g. leaf, stem, root.
 3. Compare different parts of plants e.g. leaf, stem, root according to shapes, sizes, colour and texture. State and label the transport system of the stem.



Goals of Lesson

Experiment (video)

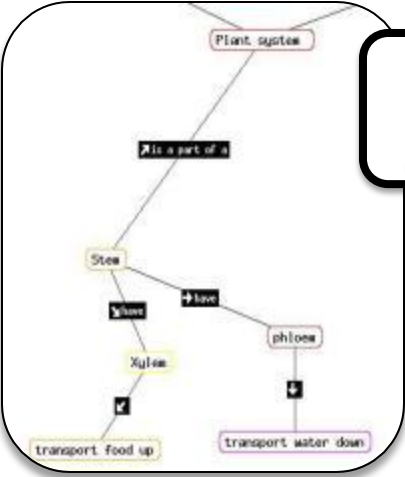
goKWL [Plants and their part] 12:43

I know
the main parts of a plant is the leaf, the stem or trunk, the leaves make food for the plant

I Wonder
how do plants make a system inside them
can you remove an inside part of the plant system with

I Learned

List! Menu



PiCo Map

Projects [Plant System]

view of Lesson on Plants and their parts

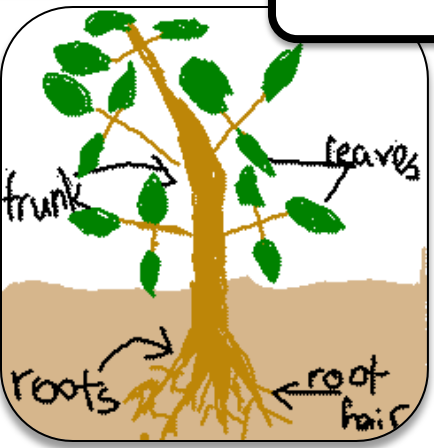
- Instructions for Plants Activity 1
- Pen system
- Instructions for Plants Activity 2
- Plants and their parts
- Instructions for Plants Activity 3
- Activity 3- Functions of plant parts
- Instructions for Plants Activity 4
- Instructions for Plants Activity 5
- Plant System
- Rubrics for Choosing the best Sketch
- Instructions for Plants Activity 6
- Plants and their Parts

KWL

MLE Lesson Package For learning Plant Systems

Sketchy

Comparison Table



Picture Taking



mobile 12:47

Activity 3 – Functions of plant parts

Parts of plant	Functions
Roots	Help the plant to hold firmly on the ground.
Root Hair	Help plant to absorb water and mineral.
Stems	Help plant to transport water and minerals.

B I U View Menu

Applications for Informal Learning

Mobile discussion forum: for “formalize informal learning”

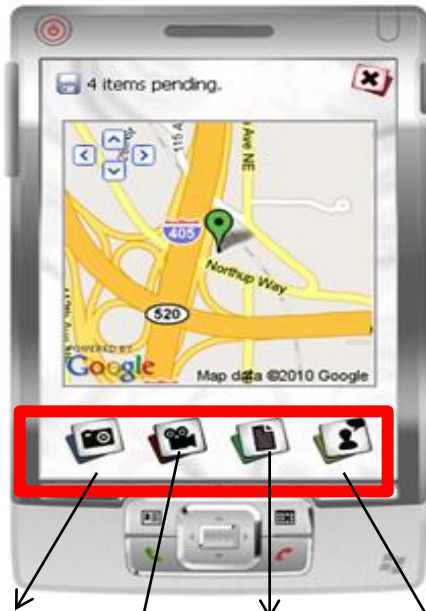


Applications for Informal Learning

ColInq

Mobile Client

Web 2.0 Client



Picture taking

Drawing

inquiry

video taking



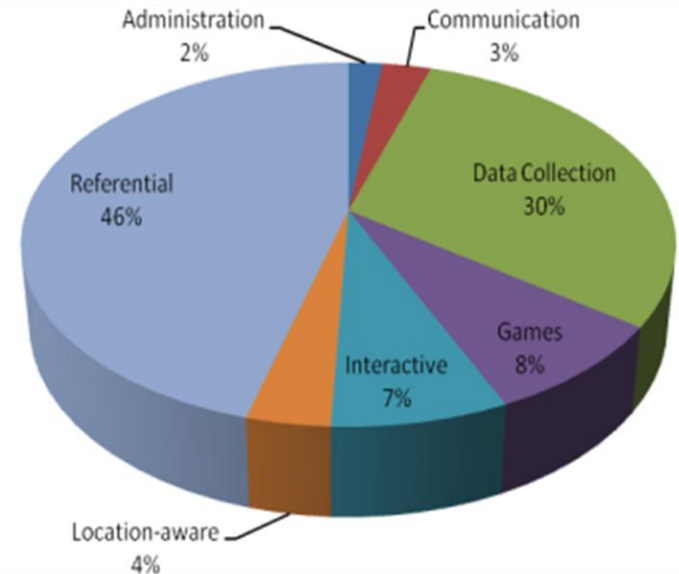
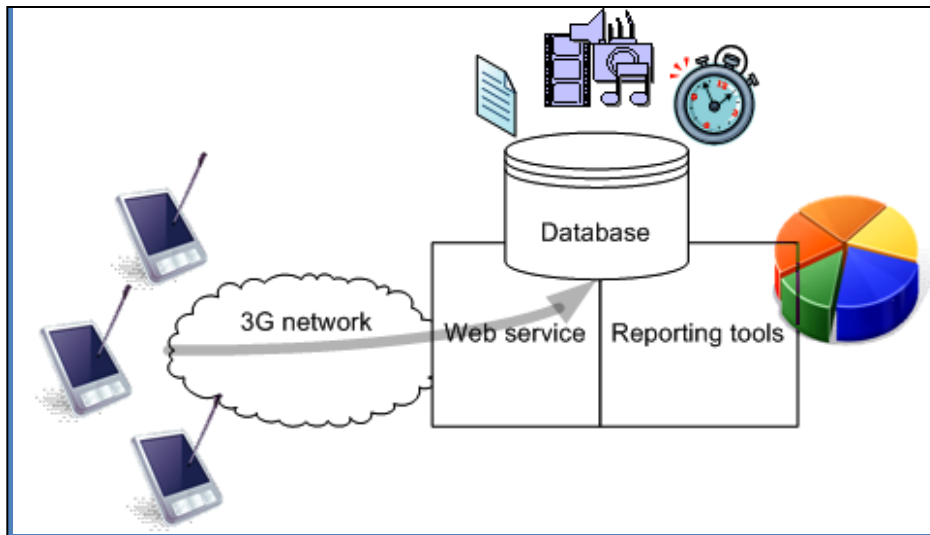
A screenshot of a web 2.0 client interface. On the left, there is a "Search results" list with several entries, each showing a date, user tag, and location. On the right, there is a map of Singapore with a "Create discussion" overlay. The overlay includes fields for "Upload date", "User tag", "Radius", and a "create discussion" button. Red circles and arrows highlight specific elements: circle 1 around the "Create discussion" button, circle 2 around the "Radius" field, circle 3 around a cluster of red location pins on the map, and circle 4 around a single red location pin. A red arrow labeled "6" points from the search results to the discussion overlay.

A screenshot of an "Inquiry learning" discussion page. It shows a "Discussion" section with a "Return to" link and a "Post comment" button. The page is titled "Inquiry learning" and has a copyright notice at the bottom.

A screenshot of a "Select users to share this content with:" dialog. It shows a list of users with checkboxes: Abel Tsee, Rachel Lim, Leticia Lim, sabel Ow, Ray Lim, and Jun Kai Yip. There is a "Share" button at the bottom.

Applications to Capture Seamless Learning

- Developed application to capture log file data & screen shots



Impact of Seamless Learning Project



Impact: Content Learning

Table 1. ANCOVA on year-end science exam scores across 6 mixed ability classes when holding the exam scores before the introduction of mobilized lessons constant (End of 2009)

Class	N	Mean Total year-end score	SD	Adjusted mean Total year-end score
3D	39	75.49	7.786	71.50
3E	39	76.67	8.588	74.11
3F	41	71.63	8.952	68.22
3G	36	41.36	16.507	48.90
3H	40	55.95	12.704	59.31
3I	39	72.13	7.706	71.87
Total	351	72.25	16.528	71.50

- Experimental class has the highest scores at year-end science exam among the 6 mixed-ability class
- The class difference explains 41% of the variance in year-end exam scores

Impact : Attitudes towards Mobile Learning

Paired-Sample t test on students' attitudes

		Mean	Std. Deviation	t
Mobile device helps me learn my class subjects.	Pre Survey	1.46	.643	-2.765**
	Post Survey	1.82	.451	
Mobile device helps me learn things outside of school.	Pre Survey	1.42	.683	-2.321*
	Post Survey	1.76	.490	
I like the learning activities using computers and gadgets.	Pre Survey	1.05	.223	-2.016*
	Post Survey	1.23	.536	
I learn more when I work in a group than alone.	Pre Survey	1.37	.633	-2.634*
	Post Survey	1.68	.662	

- students' attitudes have a positive change towards the use of mobile devices for learning in class

- **Infrastructure changes**
 - “mobilized” P3 and P4 science curriculum
 - Less worksheets
- **Teacher changes**
 - From being dominant to being a facilitator
 - Not worried about telling “I do not know”
 - Be able to design effective mobile learning activities
- **Student changes**
 - More ownership of personal constructed artifacts
 - Demonstrated self-directed and collaborative inquiry learning



Characteristics of Seamless Learning

Networked:
enhances
communication
& facilitates
collaboration

Portable:
cross time
and location

Contextualized:
construct
knowledge in situ

Seamless Learning:

Unobtrusive:
use of device
assimilated into
daily life for
communication,
reference &
learning

“formalize” informal learning
“Informolize” formal learning

Personalized:
Adapt to learner’s
evolving abilities,
skills, knowledge
& learning styles

Multi-Modal:
accommodating
versatile learning
activities

Accumulative:
resources and
knowledge are
archived and
are immediately
accessible

■ Device

- Balance between functionality and portability
- School's decision on device selection is largely depend on the applications and resources
- Business model: buying or leasing?

■ Mobile application development

- Spoon-feeding VS scaffolding

■ Understand school's perspectives

- Driven by traditional assessment
- Teachers lack support

■ Address parents' concerns

- Eyesight
- Cyber wellness



Thanks You!

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