Seamless Learning with Mobile Technologies: Perspectives from Singapore

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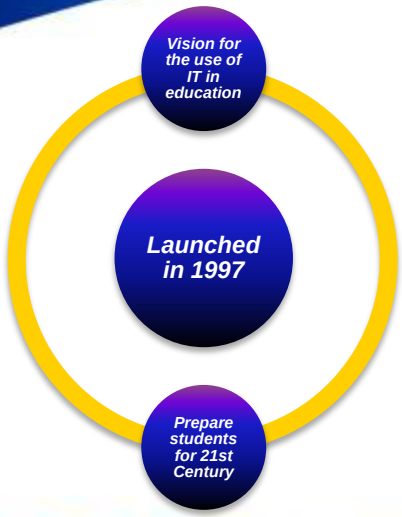
Outline

- 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

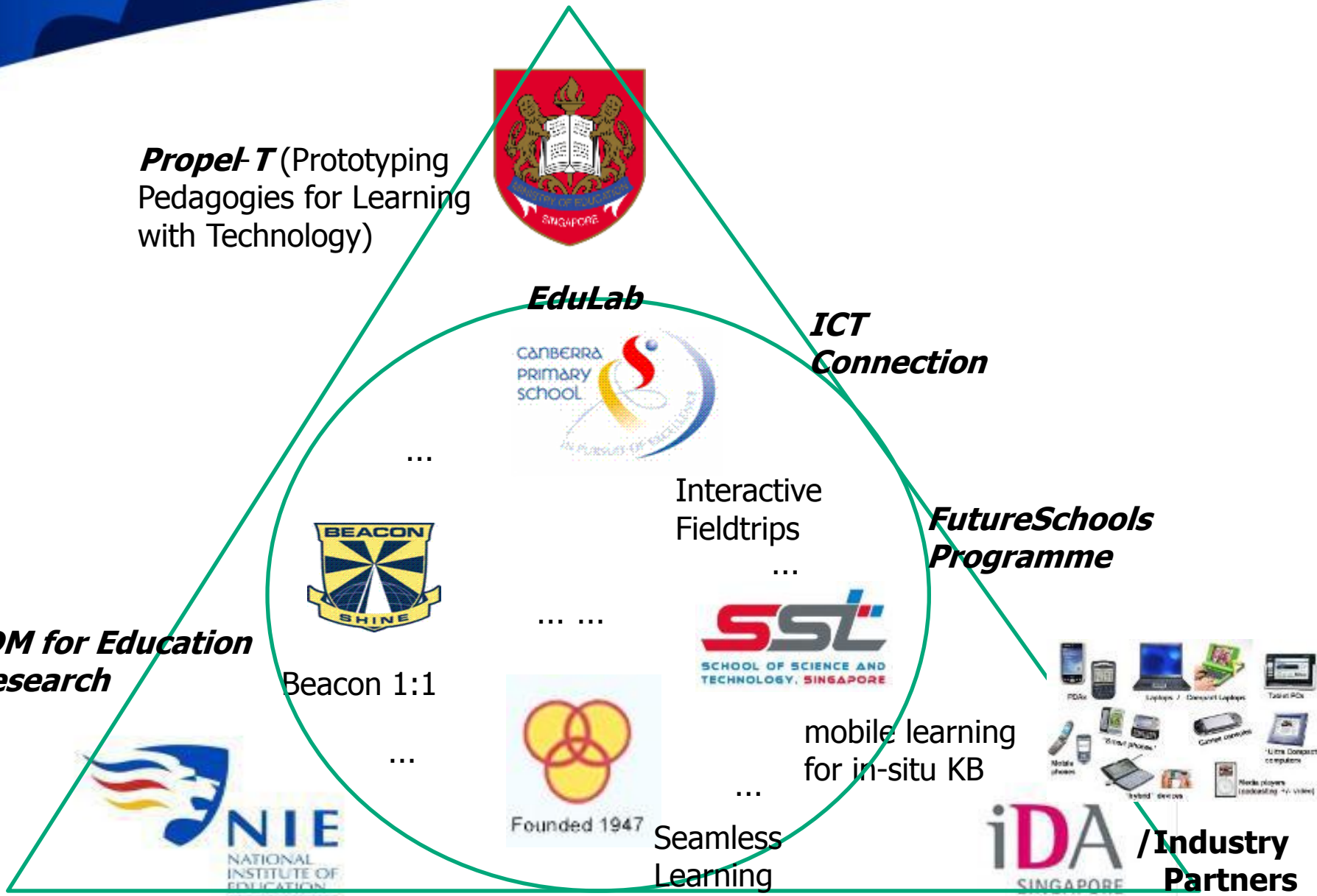


Strengthening & Scaling

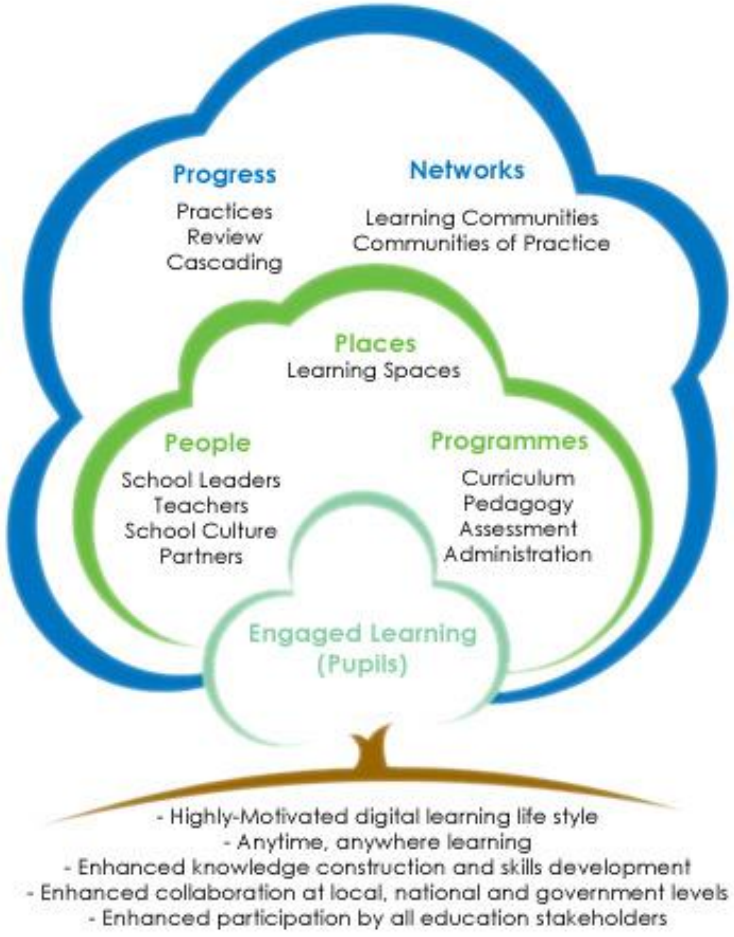
Seeding Innovation

Building the Foundation

Multi-Party Collaboration Approach



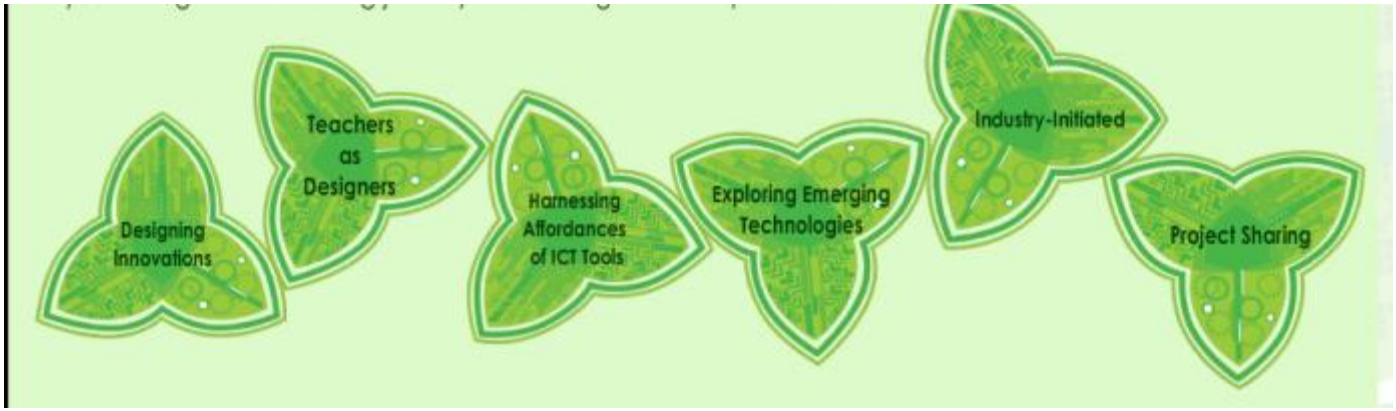
FutureSchools@Singapore



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

Notion of Seamless Learning

- 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

Our pedagogical Model: Seamless Learning with Technology

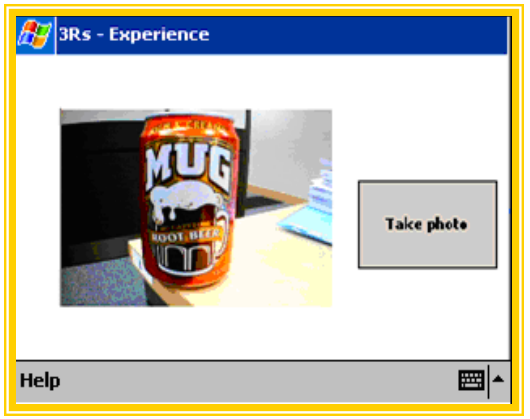
Out Class	***Type II*** **Planned learning out of class** E.g. Field trip to heritage site which is part of a school curriculum 	***Type III*** **Emergent learning out of class** E.g. Using mobile phones to capture pictures and video clips of animal and directed by self-interest 
In Class	***Type I***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

Lesson Example 1: Project 3Rs

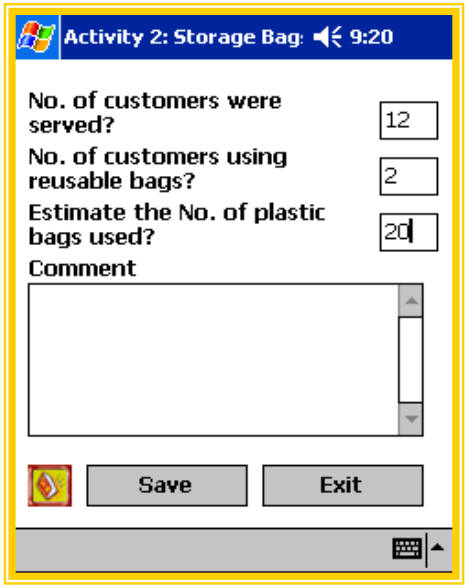
- ***Curriculum:*** Environmental issues
  - Project 3Rs: Reduce, Reuse, Recycle
- Pedagogy:
  - Challenges-Experiential learning (Bransford, et al, 2000Kolb, 1984)
- Approach
  - mobile application to scaffold deeper learning

3Rs: Mobile Learning Activity Design

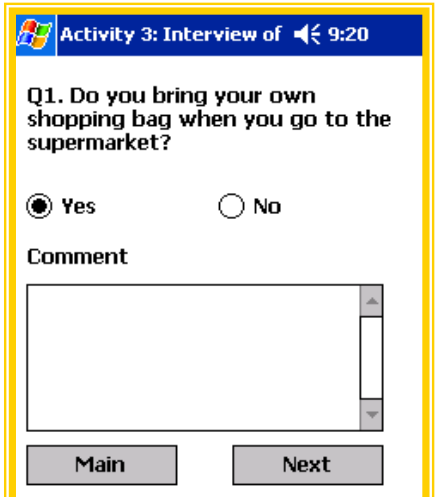
Activity 1: Packaging



Activity 2: Use of plastic bags



Activity 3: Customer interview



Challenge:

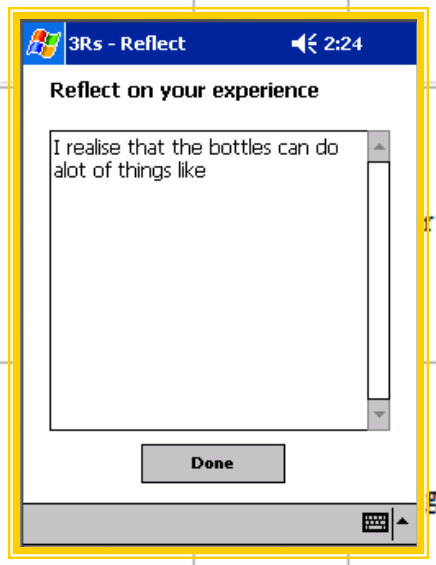
we will have less fresh water,trees and sea creatures will die and more heat will enter the Earth

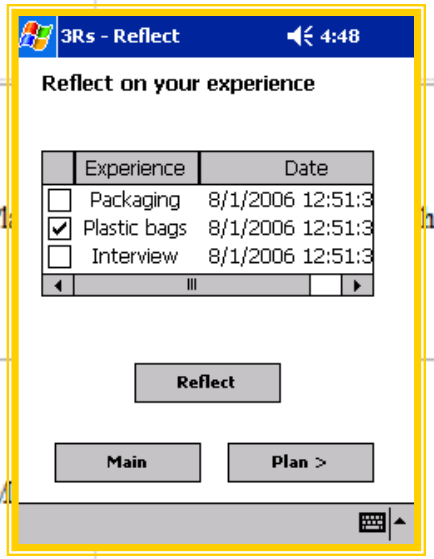
Data from Activity 1 with pictures taken of packaging

Response to the challenge presented to pupils

Activity 1:

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





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.

Project Impact

- 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: ** $p < .01$

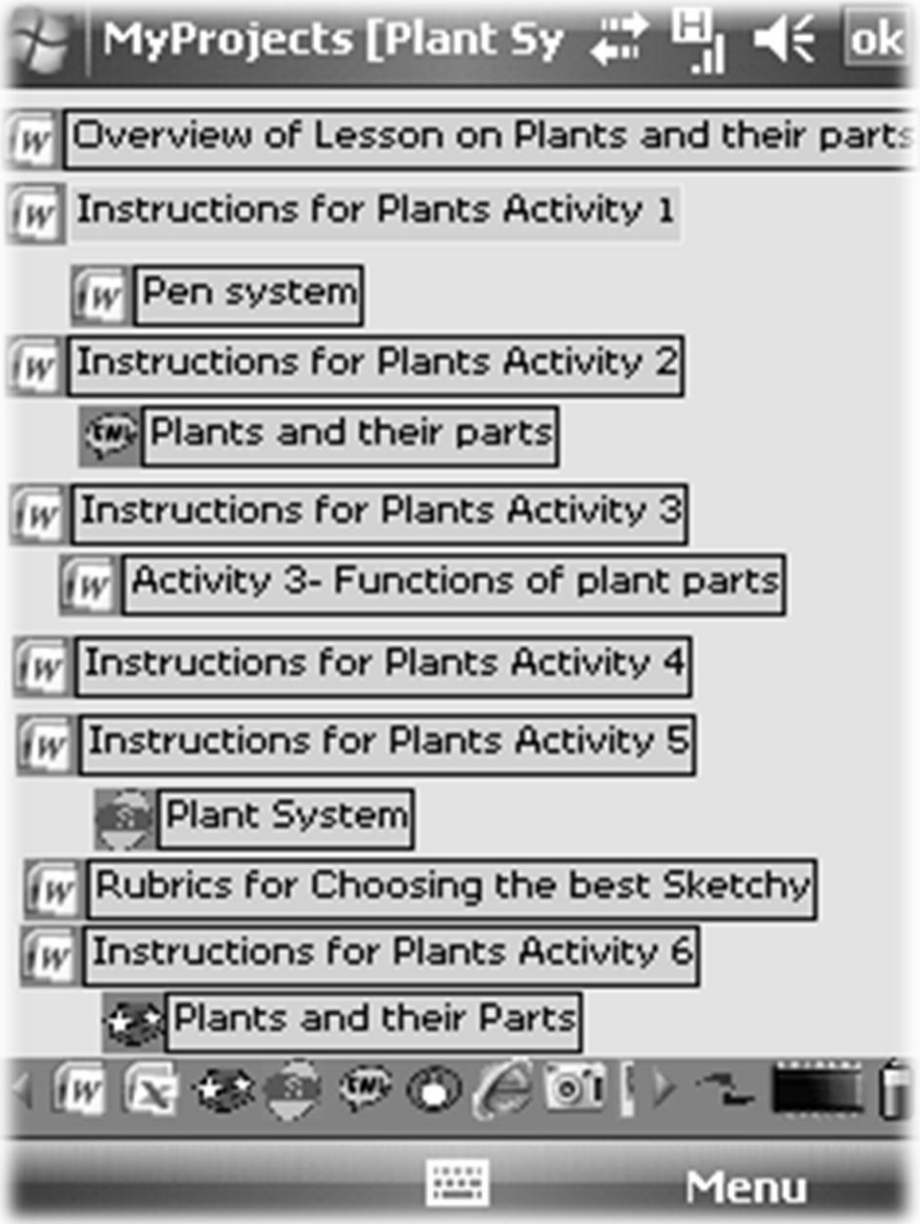
- Role of mobile application
  - To scaffold seamless learning (type I – II) through the Challenges-Experiential Cycle
  - To collect data
  - To capture students' thoughts
  - Enable collaboration by comparing, contrasting and peer commenting
  - Easily adapted to other topics

Example 2: Science – Plant System

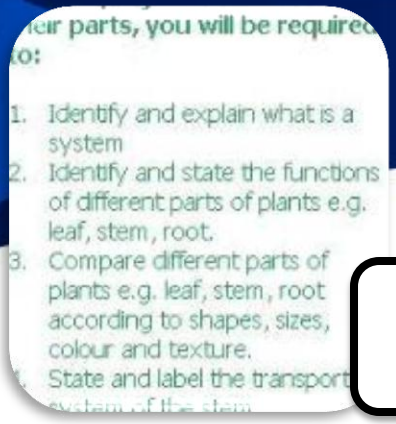
- Pedagogy
  - Inquiry-based learning
  - Multi-modal learning

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

Plant System: Activity Design

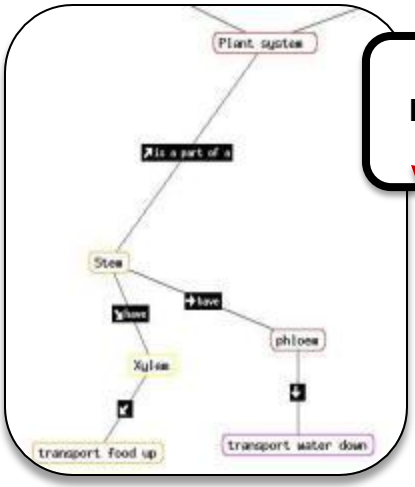


Plant System: Activity Design

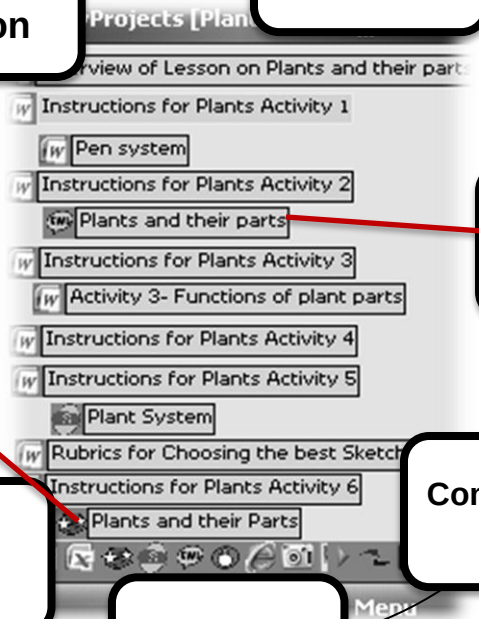


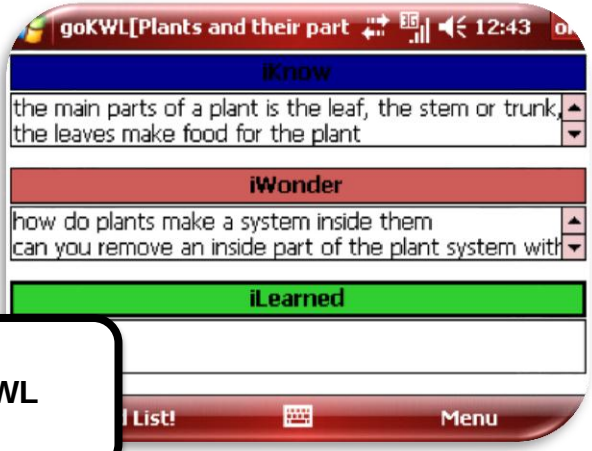
Goals of Lesson

Experiment (video)



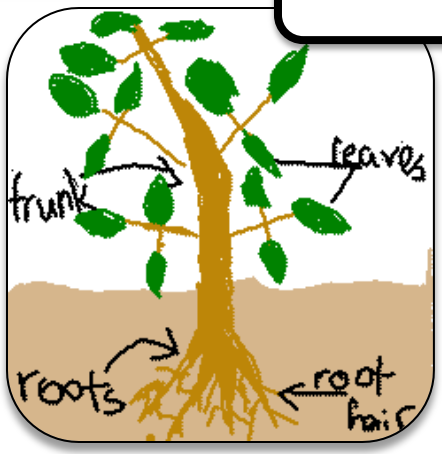
PiCo Map





KWL

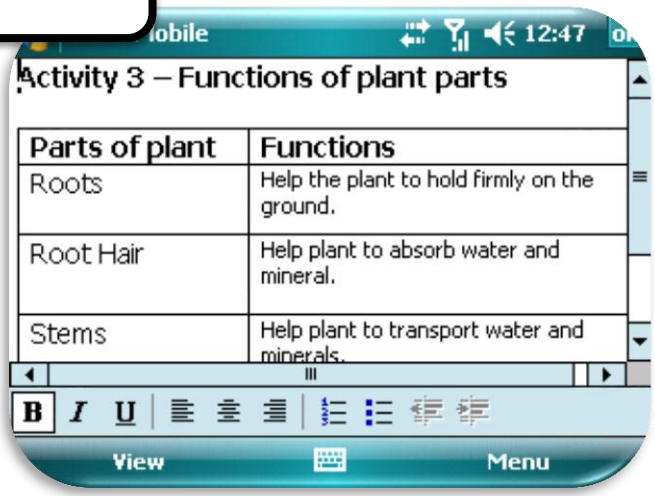
Sketchy



Comparison Table

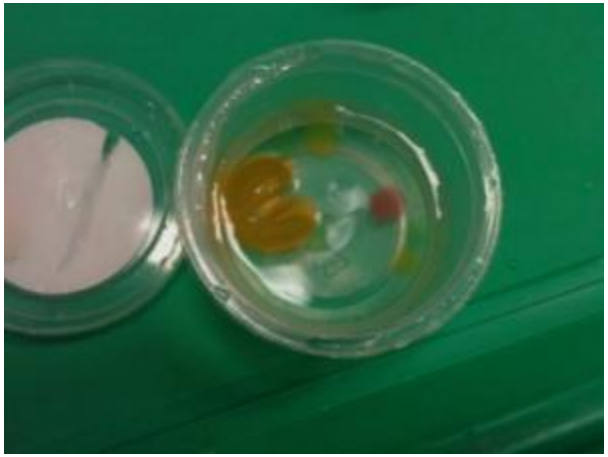
Picture Taking

MLE Lesson Package For learning Plant Systems



Applications for Informal Learning

Mobile discussion forum: for "formalize informal learning"

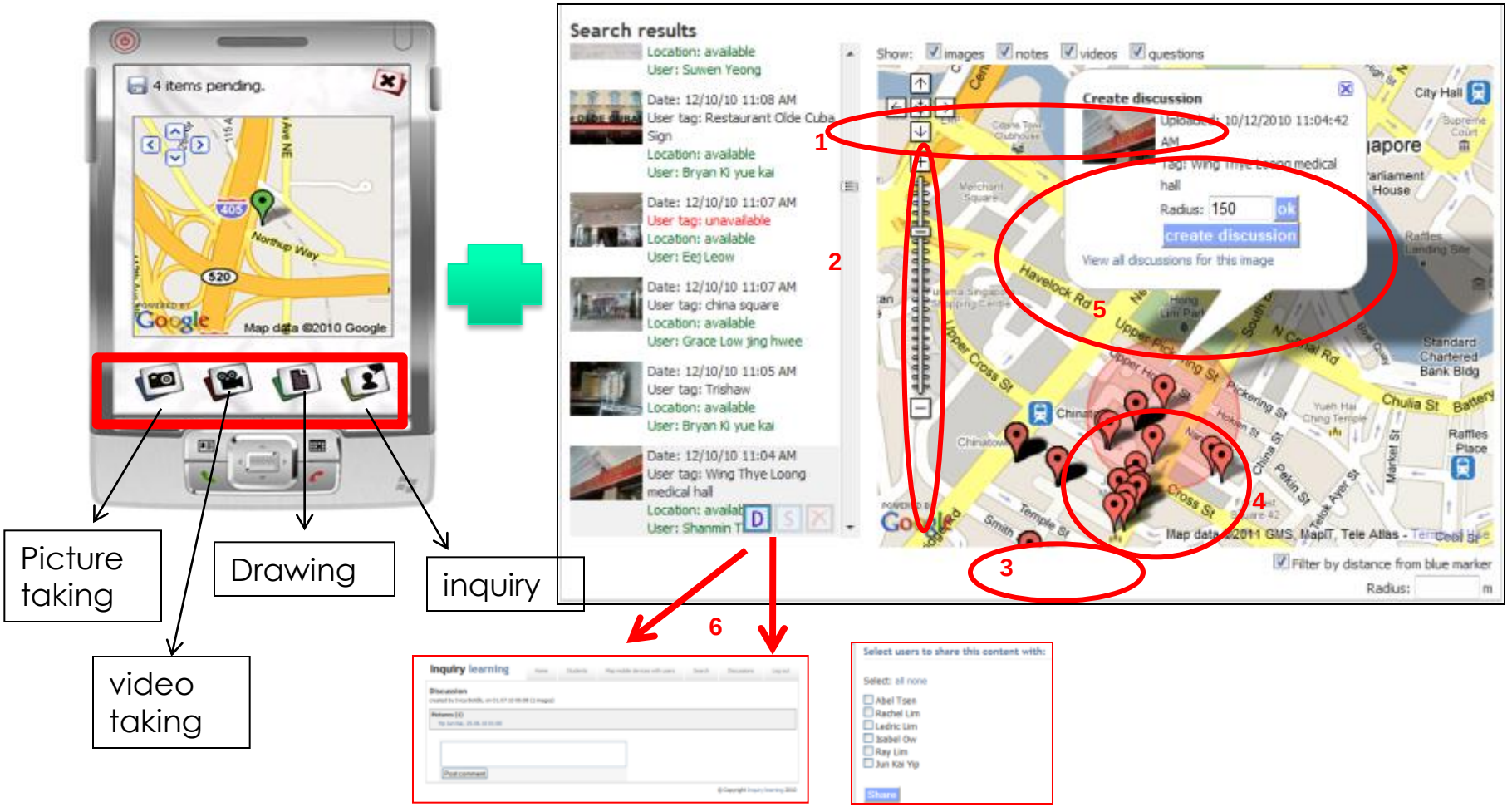


Applications for Informal Learning

ColInq

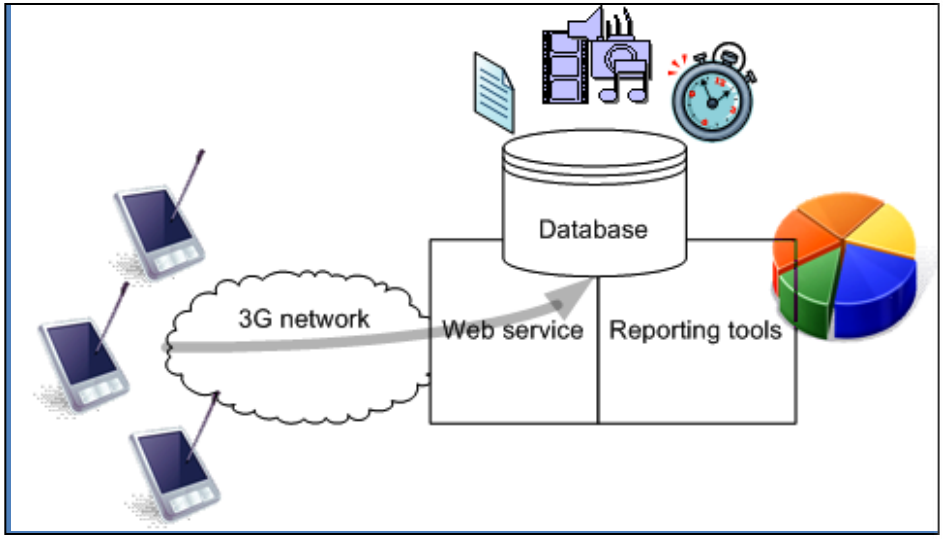
Mobile Client

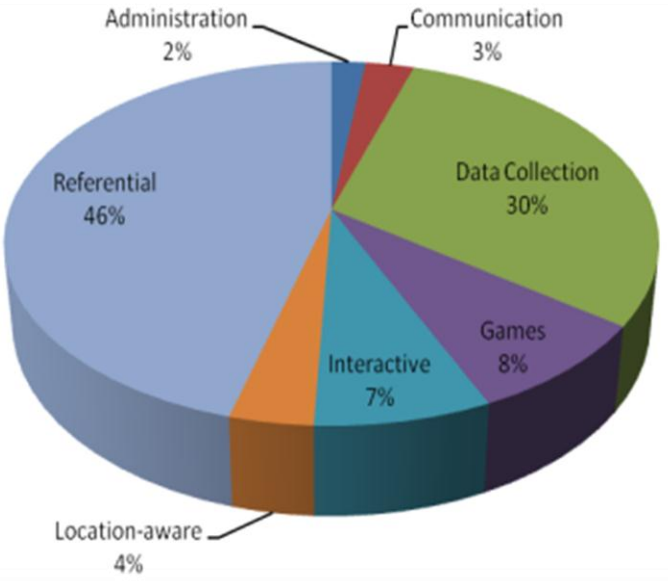
Web 2.0 Client



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

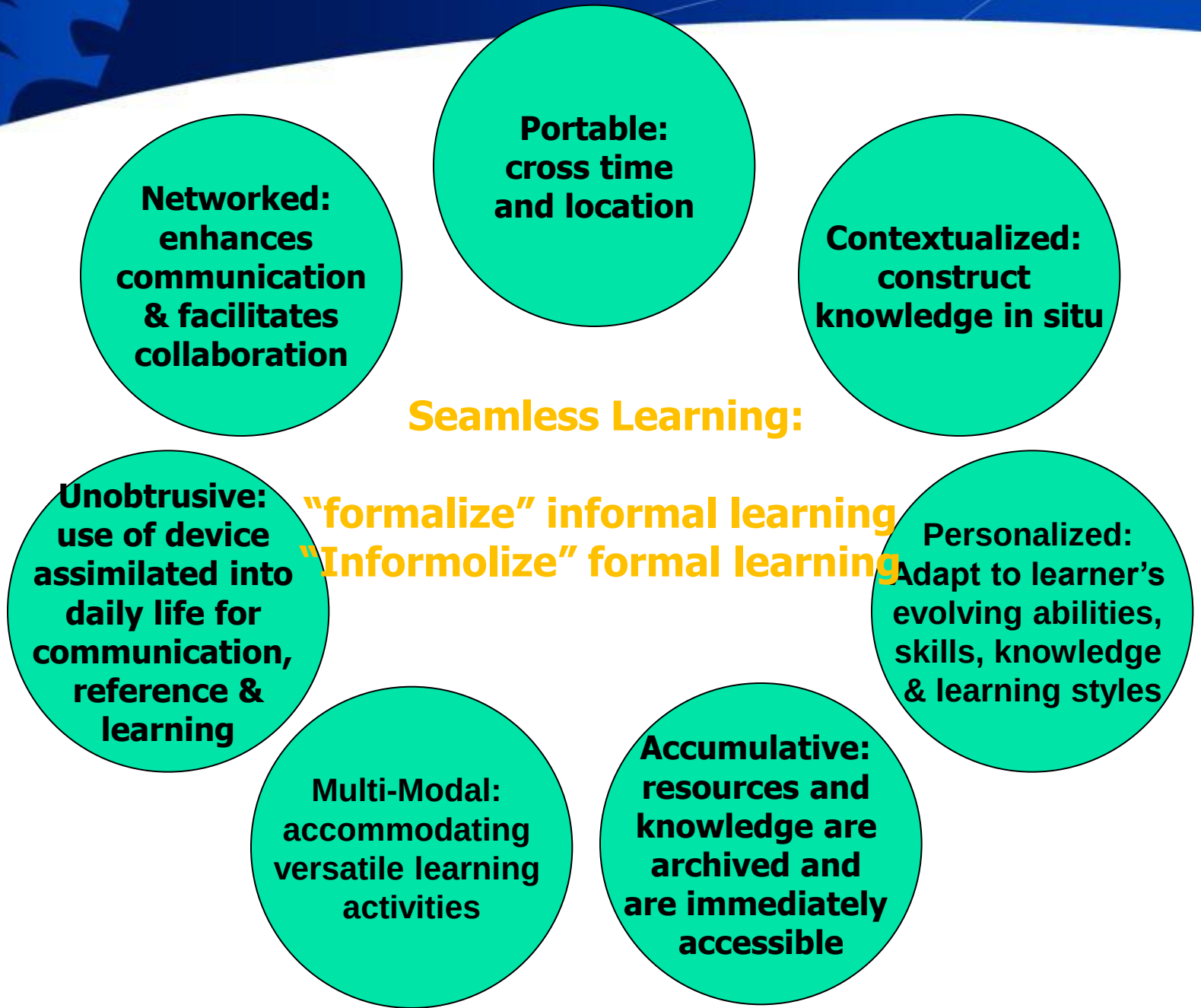
		Mean	Std. Deviation	t
Mobile device helps me learn my class subjects.	Pre Survey	1.46	.643	-2.765**
	Post Survey	1.82	.451	
Mobile device helps me learn things outside of school.	Pre Survey	1.42	.683	-2.321*
	Post Survey	1.76	.490	
I like the learning activities using computers and gadgets.	Pre Survey	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

Deeper Impact

- 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



Current Issues for Mobile Learning

- 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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