Personalized Learning
in
the Age of Mobile Connectivity

The Potential Impacts
on Libraries & Digital Archives

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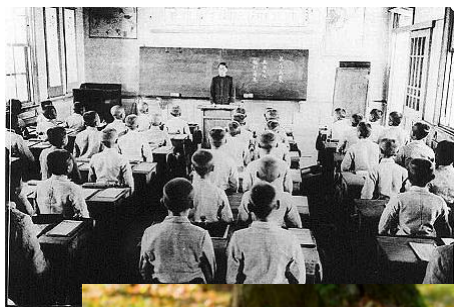*Nanyang Technological University, Singapore*

NATIONAL INSTITUTE OF EDUCATION SINGAPORE

Learning Sciences Lab

"Library of the Past"?

"Library of the Future"?

But ... where shall *learning* take place?

The conference planning committee hard at work!

We are entering the age of
mobile connectivity …

- According to Horizon Reports (2004-2011) …
  http://www.nmc.org/
  The most mentioned upcoming learning technologies are …
  1. Mobile learning ('06, '07, '08, '09, '10, '11)
  2. Augmented reality ('05, '06, '10, '11)

     Game-based learning ('05, '06, '07, '11)

     Knowledge webs / new scholarship & emerging forms of publication / collective intelligence ('04, '05, '07, '08)

… and what are more relevant to "libraries" (i.e., representation of knowledge)?

- According to Horizon Reports (again) …
  - Intelligent searching ('05)
  - Open content ('10)
  - E-books ('10, '11)
- … and may be relevant too …
  - Knowledge webs / new scholarship & emerging forms of publication / collective intel. ('04, '05, '07, '08)
  - Personal broadcasting / user-created content / grassroot videos ('06, '07, '08)

The prevailing trend …
personalized learning!

- Most of the prevailing learning technologies are meant for empowering learners …
  - to challenge transmissionist/behaviorist learning
- Let learners self-select (analogy of fishing) …
  - Learning goals
  - Learning paths
  - Learning methods, strategies
  - Learning resources (**content/knowledge vs. resources**)
- Authentic learning, e.g., Augmented Reality

But why mobile technology?

Mobile technology is NOT just about easy access of e-books, etc.

Chan, Roschelle, Hsi, Kinshuk, Sharples, Brown, et al. (2006):

- 便攜性　(portability)
- 社群互動性　(social interactivity)
- 個人化　(individuality)
- 情境感知性　(context sensitivity)
- 連接性　(connectivity)
- 整合真實與虛擬世界　(bridging physical & digital worlds)

Chan, T.-W., et al. (2006). One-to-one technology-enhanced learning: An opportunity for global research collaboration. *Research and Practice in Technology-Enhanced Learning, 1*(1), 3-29.

3 generations of mobile learning?
余勝泉(2007)

- 1st gen: transfer of information (transmissionist, behaviorist)
  - relevant to libraries?
- 2nd gen: instructional design-centric (cognitivism, constructivism)
- 3rd gen: 1:1 and context-aware (personalization, situated learning)

Seamless Learning

- Continuity of the learning experiences across different contexts/spaces (Chan et al., 2006)
  - Formal + informal
  - Individual + social
  - Physical + digital …
- Mediated by: 1:1, 24x7 access to mobile devices
- Hard to tell when is the beginning and the end of learning (Sharples, 2009)
- Seamless learning ≠ ubiquitous learning

Studies on seamless learning (2006-2011)

Conceptualization of 1:1 seamless learning	11	Taiwan, Australia, Singapore, Mainland China, UK, USA, Portugal
1:1 classroom learning	4	Taiwan, Mainland China, Japan
One-off or short-term 1:1 context-aware learning	19	Taiwan, Sweden, Japan, USA, Chile, UK, Germany, Singapore
Ongoing specific 1:1 seamless learning activities	9	Taiwan, USA, Japan, Mainland China, Singapore, France
Long-term 1:1, 24x7 programs	11	Taiwan, USA, UK, Pakistan, Hong Kong, Mainland China, Japan, Singapore

Wong, L.-H., & Looi, C.-K. (2011). What seams do we remove in mobile assisted seamless learning? A critical review of the literature. *Computers & Education*, 57(4), 2364-2381.

Our studies in Singapore:

1. SEAMLESS Project
2. "Move, Idioms!" → MyCLOUD

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10 Dimensions of *Mobile* Seamless Learning (MSL)
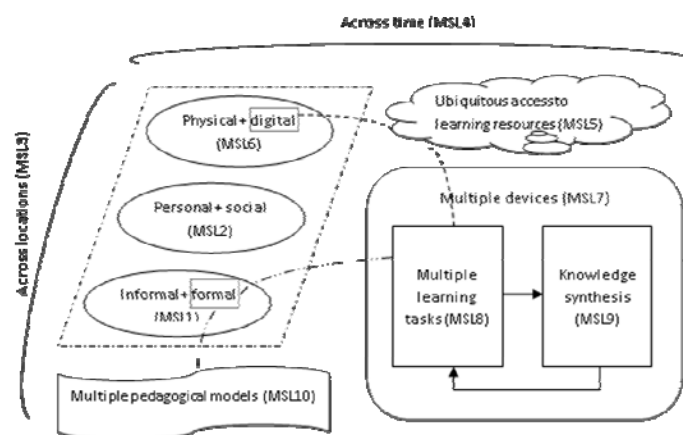
Wong, L.-H., & Looi, C.-K. (2011). What seams do we remove in mobile assisted seamless learning? A critical review of the literature. *Computers & Education*, 57(4), 2364-2381.

Wong, L.-H. (2012). A learner-centric view of mobile seamless learning. *British Journal of Educational Technology, 43*(1), E19-E23.

But, why seamless learning?

- Not feasible to equip students with all the skills and knowledge they need for lifelong learning solely through formal learning (Chen et al., 2010)
- Learners should move beyond the acquisition of content knowledge to develop the capacity to learn seamlessly
- Nature of learning: Sense making! Construct and reconstruct your own knowledge!

Facilitated vs Self-Directed
Seamless Learning

促成性無縫學習
(Facilitated Seamless Learning, **FSL**)

自主性無縫學習
(Self-Directed Seamless Learning, **SDSL**)

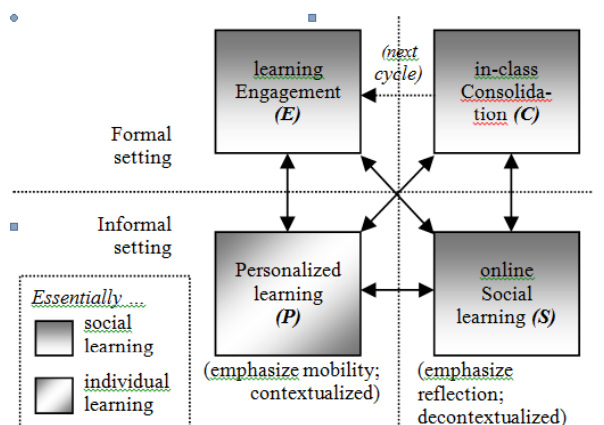黃龍翔(2010) *從促成性無縫學習到自主性無縫學習*。《2010年全球華人計算機教育應用大會》（頁33-40），新加坡。

Wong, L.-H., & Looi, C.-K. (2012). Enculturing self-directed seamless learners: Towards a facilitated seamless learning process framework mediated by mobile technology. *Proceedings of the IEEE WMUTE '12* (pp. 1-8), Takamatsu, Japan.

Enculturating Seamless Learners

- *Enculturation*! –long-term *facilitated seamless learning* that engage learners in an ongoing enculturation process …

- … to progressively transform their existing beliefs and methods of learning …


Facilitated Seamless Learning (FSL) Process Framework

黃龍翔(2010) *從促成性無縫學習到自主性無縫學習。*《2010年全球華人計算機教育應用大會》（頁33-40），新加坡。

Wong, L.-H., & Looi, C.-K. (2012). Enculturing self-directed seamless learners: Towards a facilitated seamless learning process framework mediated by mobile technology. *Proceedings of the IEEE WMUTE '12* (pp. 1-8), Takamatsu, Japan.

# Mapping FSL Framework to 10 Dimensions of MSL
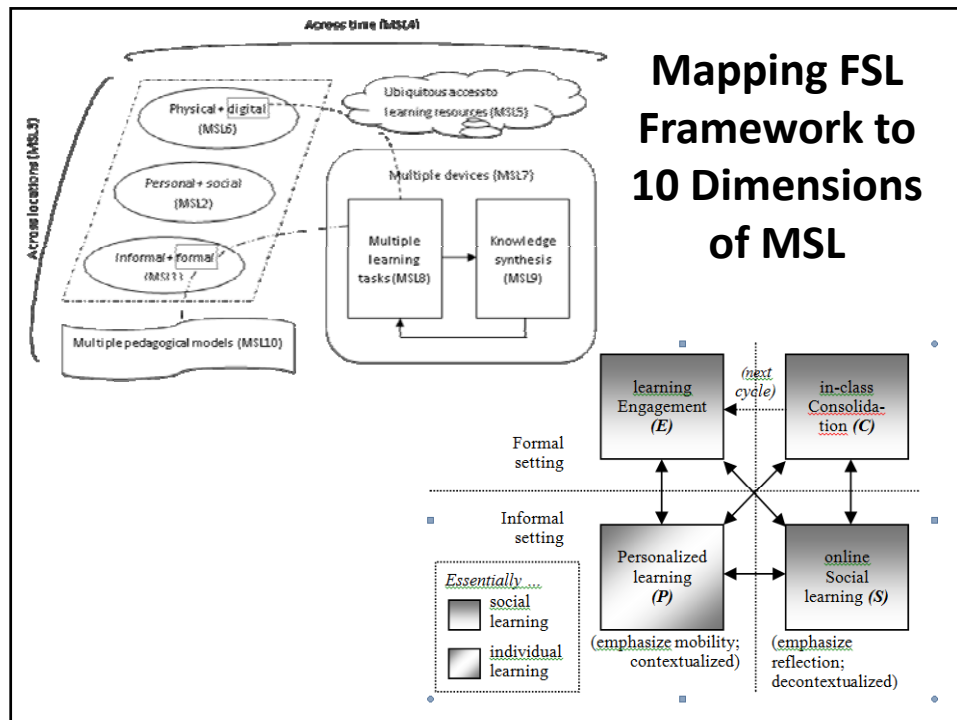
Case Study 1

The SEAMLESS PRoject

- Purpose: to develop an educational ecology for sustainable 1:1, 24x7 seamless learning within a primary school
- Primary 3-4 science curriculum design: 12 MLE units; Design-based research
- Each students were assigned HTC TnTN II, with GoKnow MLE
- The learning flows encapsulated in the MLE units resemble the FSL process

Looi, C.-K., Seow, P., Zhang, B. H., So, H.-J., Chen, W., & Wong, L.-H. (2010). Leveraging mobile technology for sustainable seamless learning: A research agenda. *British Journal of Educational Technology, 42*(1), 154-169.

(see also: So, Kim & Looi, 2008; Sha et al., 2011; Toh et al., in-press …)
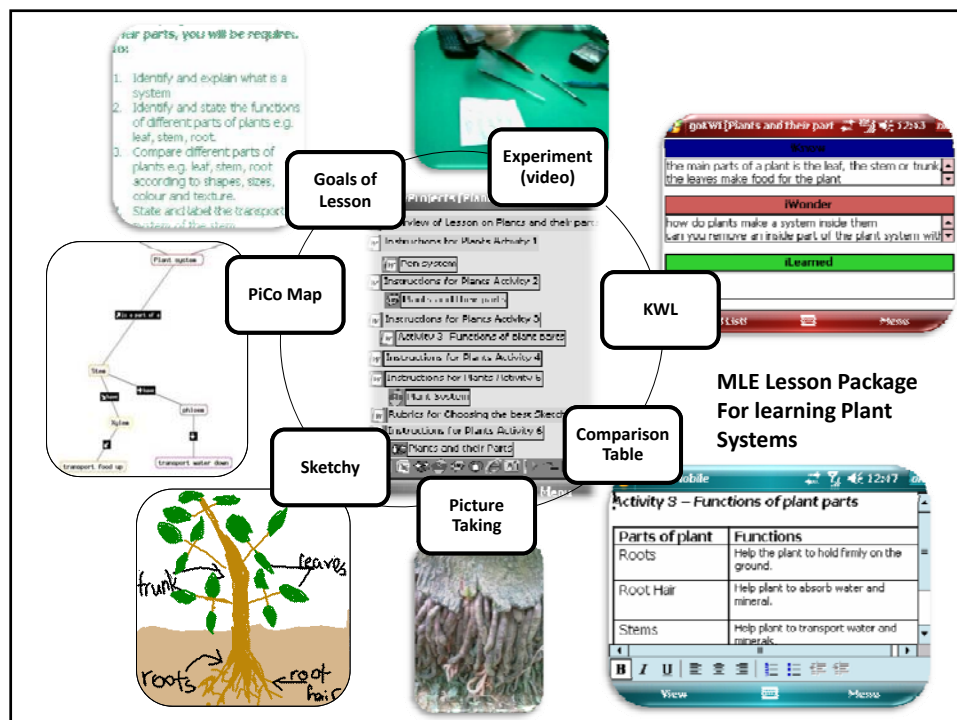
The Science MLE Curriculum: Activity Types

Activity ID	Activity Type	Mobile Affordances	Usually taking place in which FSL activity? (ref. Figure 1)
KWL	KWL activities	KWL	(P) + (C)
Anim	Animation creation	Sketchy	(P) + (C)
Photo	Photo taking	Built-in camera	(E) or (C)
CMap	Concept mapping	PicoMap	(P) + (C)
Discuss	Online artifact sharing & discussion	Blog / mobile forum	(S)
Field	Field trip	Video, photo & note taking tools	(E)
Exp	Scientific experiment		(E) or (P)
Parent	Activities involving parents	Video & other tools	(P)
Web	Web search & media playing	IE, YouTube app	(E) or (P) or (S)
ColInq	In-situ multimedia content creation & forum discussion	ColInq	(P) + (S)

The Science MLE Curriculum: Systematic Variation of Activities

| Unit ID	Topic	KWL	Anim	Photo	CMap	Discuss	Field	Exp	Parent	Web	ColInq
U1	Living & non-living things	√									
U2	Animals	√	√								
U3	Plant	√	√	√	√						
U4	Plants & their parts	√	√	√	√	√					
U5	Fungi	√	√	√	√		√				
U6	Materials	√	√	√				√			
U7	Body systems	√	√						√	√	
U8	Cycles	√	√			√	√			√	
U9	Matter	√	√	√							
U10	Light & shadow		√					√			
U11	Heat & Temperature	√	√	√							
U12	Magnet		√		√			√	√	√	√

Zhang, B. H., Looi, C.-K., Seow, P., Chia, G., Wong, L.-H., Chen, W., et al. (2010). Deconstructing and reconstructing: Transforming primary science learning via a mobilized curriculum. *Computers & Education, 55*(4), 1504-1523.
Song, Y., Wong, L.-H., & Looi, C.-K. (in-press). Fostering personalized learning in science inquiry supported by mobile technologies. *Accepted by: Educational Technology Research and Development.*

Example: U4 – Plants & Their Parts
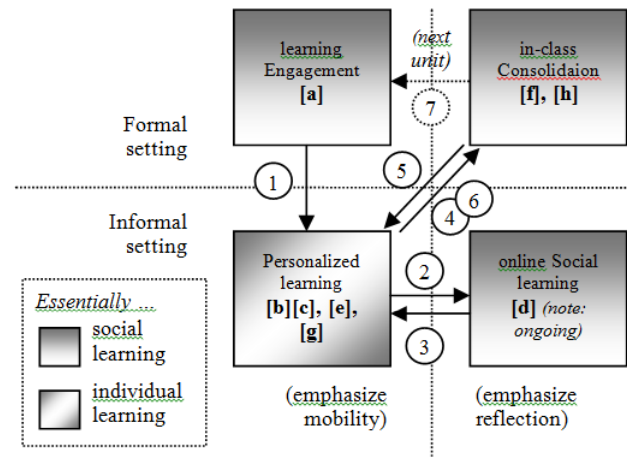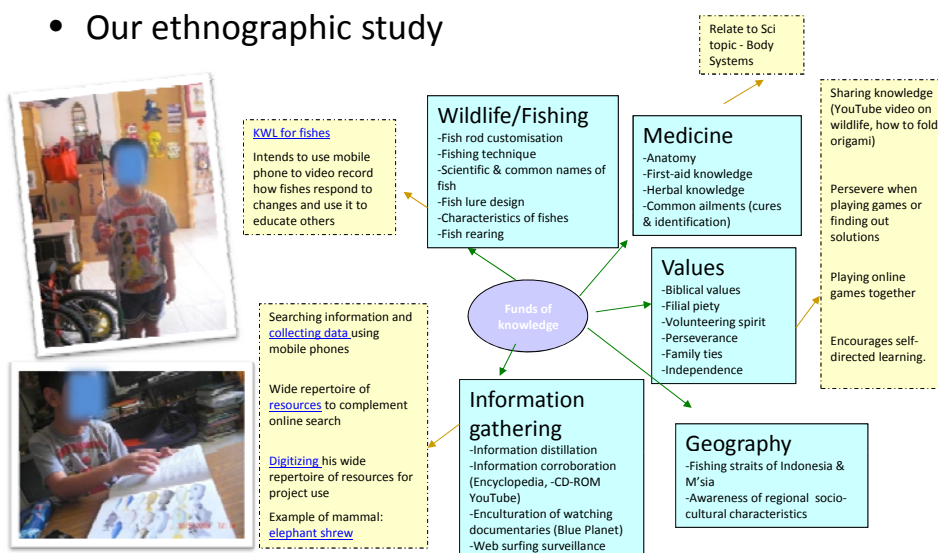

Selected Students Artifacts from U4
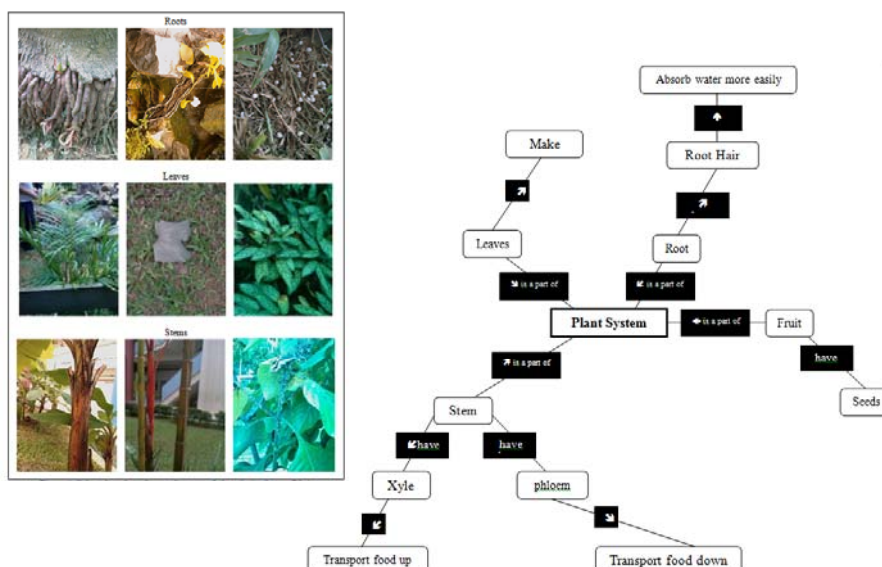
So … how self-directed-*ness* was gradually nurtured?

- 2 salient characteristics of m-learning: mobility & personalization →
  - Bringing students 'back' to the physical reality!
  - Blending their learning into their daily life with less structured activities … greater learner agency!
  - Students to be observant! Grab spontaneous learning opportunities! Actively making meaning!

Looi, C.-K., Wong, L.-H., & Song, Y. (in-press). Discovering Mobile Computer Supported Collaborative Learning. In C. Hmelo-Silver, A. O'Donnell, C. Chan & C. Chinn (Eds.), *The International Handbook of Collaborative Learning*. New York: Routledge.

- Our ethnographic study

Relate to Sci topic - Body Systems

Wildlife/Fishing
-Fish rod customisation
-Fishing technique
-Scientific & common names of fish
-Fish lure design
-Characteristics of fishes
-Fish rearing

Medicine
-Anatomy
-First-aid knowledge
-Herbal knowledge
-Common ailments (cures & identification)

Sharing knowledge (YouTube video on wildlife, how to fold origami)

Persevere when playing games or finding out solutions

Playing online games together

Encourages self-directed learning.

KWL for fishes

Intends to use mobile phone to video record how fishes respond to changes and use it to educate others

Values
-Biblical values
-Filial piety
-Volunteering spirit
-Perseverance
-Family ties
-Independence

Funds of knowledge

Searching information and collecting data using mobile phones

Wide repertoire of resources to complement online search

Digitizing his wide repertoire of resources for project use

Example of mammal: elephant shrew

Information gathering
-Information distillation
-Information corroboration (Encyclopedia, -CD-ROM YouTube)
-Enculturation of watching documentaries (Blue Planet)
-Web surfing surveillance

Geography
-Fishing straits of Indonesia & M'sia
-Awareness of regional socio-cultural characteristics

Chen, W., Seow, P., So, H.-J., Toh, Y., & Looi, C.-K. (2010). Extending students' learning spaces: Technology-supported seamless learning. *Proceedings of the International Conference on Learning Sciences 2010* (pp. 484-491), Chicago, USA.

Case Study 2

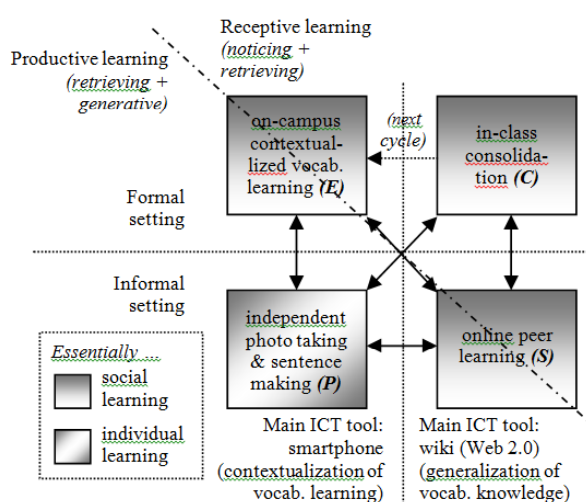

"Move, Idioms!" 成語，動起來！

- Design-based Research, Feb-Nov 2010
- 48 Chinese idioms + 8 conjunctions
- 34 students from P5 class, 1:1, 24x7 access to Samsung Omnia II
- Used open-source xwiki to create a wiki space for artifact sharing & peer reviews

Wong, L.-H., & Looi, C.-K. (2010). Vocabulary learning by mobile-assisted authentic content creation and social meaning making: Two case studies. *Computer Assisted Learning, 26*(5), 421-433.
Wong, L.-H., Song, Y., Chai, C.-S., & Zhan, Y. (2011). Analyzing students' after-school artifact creation processes in a mobile-assisted language learning environment. *Proceedings of ICCE '11* (pp. 349-356), Chiangmai, Thailand.

Applying FSL Framework to Design…

Receptive learning
(*noticing* + *retrieving*)

Productive learning
(*retrieving* + *generative*)

(*next cycle*)

on-campus contextual-lized vocab. learning *(E)*

in-class consolida-tion *(C)*

Formal setting

Informal setting

Essentially ….

social learning

individual learning

independent photo taking & sentence making *(P)*

online peer learning *(S)*

Main ICT tool: smartphone (contextualization of vocab. learning)

Main ICT tool: wiki (Web 2.0) (generalization of vocab. knowledge)

Designed 8 cycles of FSL activities in an ongoing basis; in each cycle …

黄龙翔, & 陈之权. (2011). 以设计型研究方法执行流动学习历程"成语，动起来！"中的课程设计. *华文学刊, 9*(2), 65-78.
Wong, L.-H., Chen, W., & Jan, M. (in-press). How artefacts mediate small group co-creation activities in a mobile-assisted language learning environment? *Journal of Computer Assisted Learning*.

Examples of Student Artifacts

Idioms	Artifact created within the school	Artifact created at home	Artifact created in other locations
东倒西歪 Rickety	(the student manipulated the chair and the ball to create the context for the artifact)	(the student manipulated the standing fan at home)	(a tree at the neighborhood; the twisted camera angle further highlights the meaning of the idiom)
争先恐后 Striving to be the first	(students enacting a scenario)	(Singapore dollar notes on the floor)	(a standee in a cinema)
指手画脚 Gesticulating	(a visiting educator from Kuwait pointing his finger at the students)	(a student's nagging father)	(street performers outside a museum)

From Personal Meaning Making to Social Meaning Making

- Artifact creation – personally or with peers/family members
- Online peer learning – learning from peers vs. learning with peers (inductively construct generalized, decontextualized vocab knowledge)

Wong, L.-H., Chin, C.-K., Tan, C.-L., & Liu, M. (2010). Students' personal and social meaning making in a Chinese idiom mobile learning environment. *Educational Technology & Society, 13*(4), 15-26.

Can Mobile & Ubiquitous Technology Help?

- Personalized mobile device as a *'learning hub'*
  - Learning affordances + learner history (Wong, 2012)

Learning affordances

Learner history

Informal settings

Formal settings
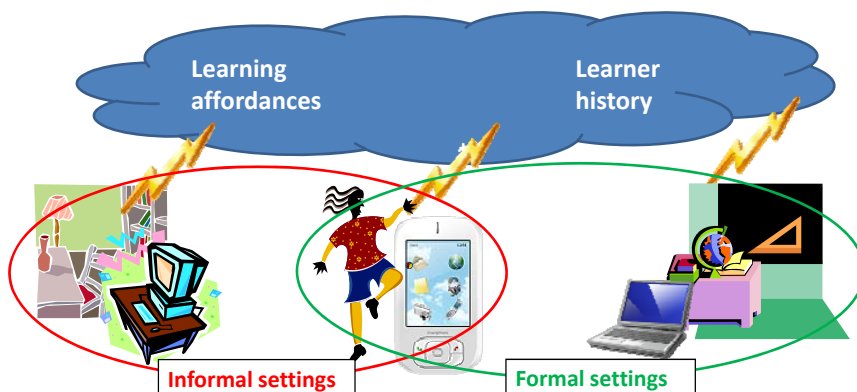
Follow-up Project:
MyCLOUD 語飛行雲

- My Chinese Language ubiquitOUs learning Days
- MOI signed on Oct 7, 2010
  - National Institute of Education
  - Singapore Centre for Chinese Language
  - Nan Chiau Primary School
  - Microsoft Singapore

MyCLOUD
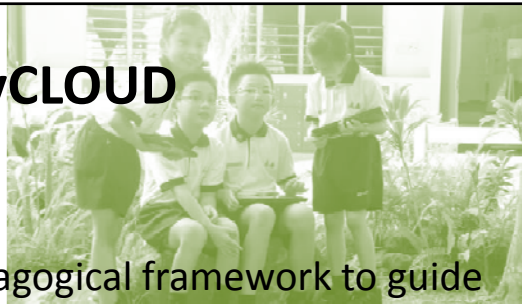
- A socio-techno-pedagogical framework to guide the learning design
- New platform (mobile + cloud computing)
  - My Mictionary; Class Mictionary
  - Integration into formal class, revamping classroom pedagogy
  - Scalability: platform will be device-independent
  - Integrating linguistic technologies by Microsoft Research Asia, Beijing

The Socio-Techno-Pedagogical Framework

Formal learning space

In-class learning

In-class consolidation

Seamless learning dimension

Informal learning space

Contextual, personalized learning

Online peer learning

Form-meaning

Construction of Mental lexicon

Contextualized, incidental learning

Decontex-tualization

Language learning dimension
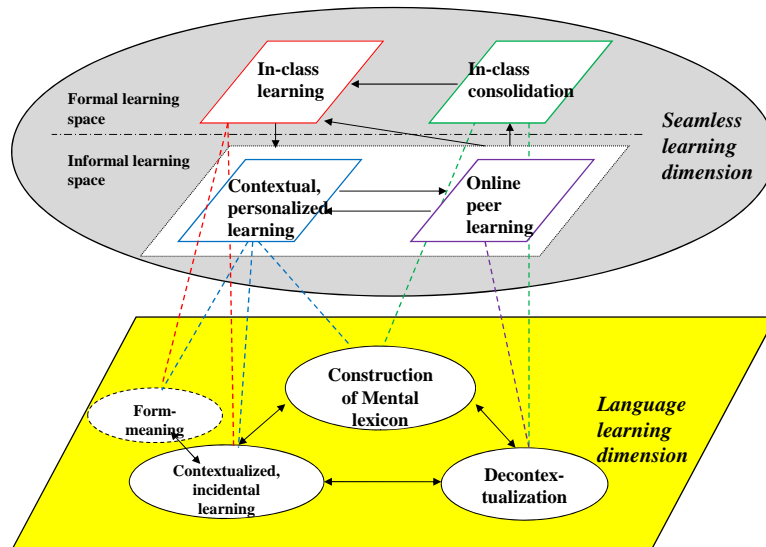
Wong, L.-H., Chai, C.-S., Chin, C.-K., Hsieh, Y.-F., & Liu, M. (2011). Leveraging Ubiquitous Technology for Seamless Language Learning: From "Move, Idioms!" to MyCLOUD. *Proceedings of the mLearn '11* (pp. 231-239), Beijing, China.
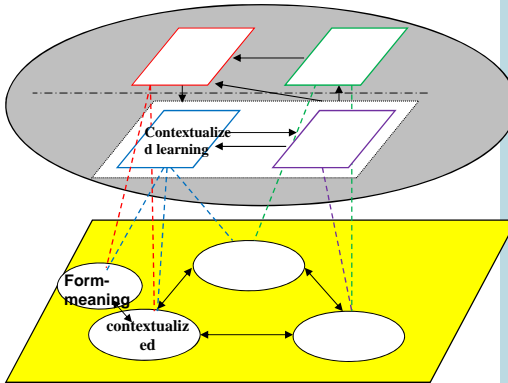
During classroom lesson …

Highlight & right click …

My Mictionary …

How did my classmates use it? …

Social
Networking …
more personalized

So, what has our MSL research informed us so far?

- Longer term, multi-cycle SL design
  - … to enculturate students towards self-directed seamless learners
  - Systematic variation of activity design across FSL cycles to facilitate learners' progressive growth in both content knowledge & SL skills/mindset
- A spiral style design:
  - in present cycle, target knowledge to learn, learning activity types, skill sets to learn & apply, mobile affordances to use, and student artifacts to reuse & create, are all building on or rising above previous cycles.

The Research Team of SEAMLESS Project
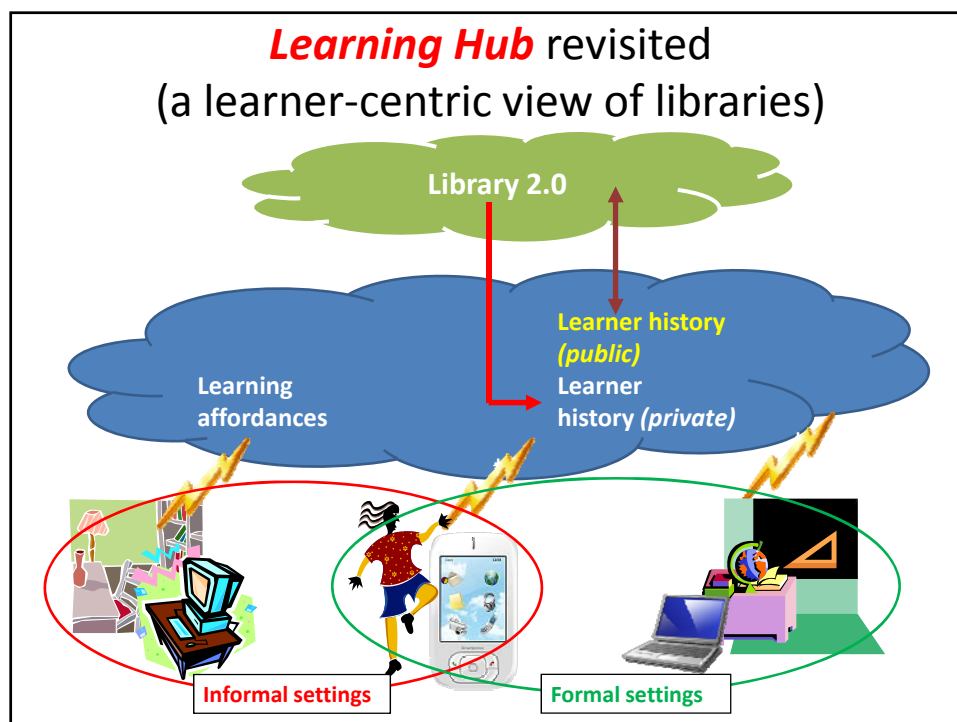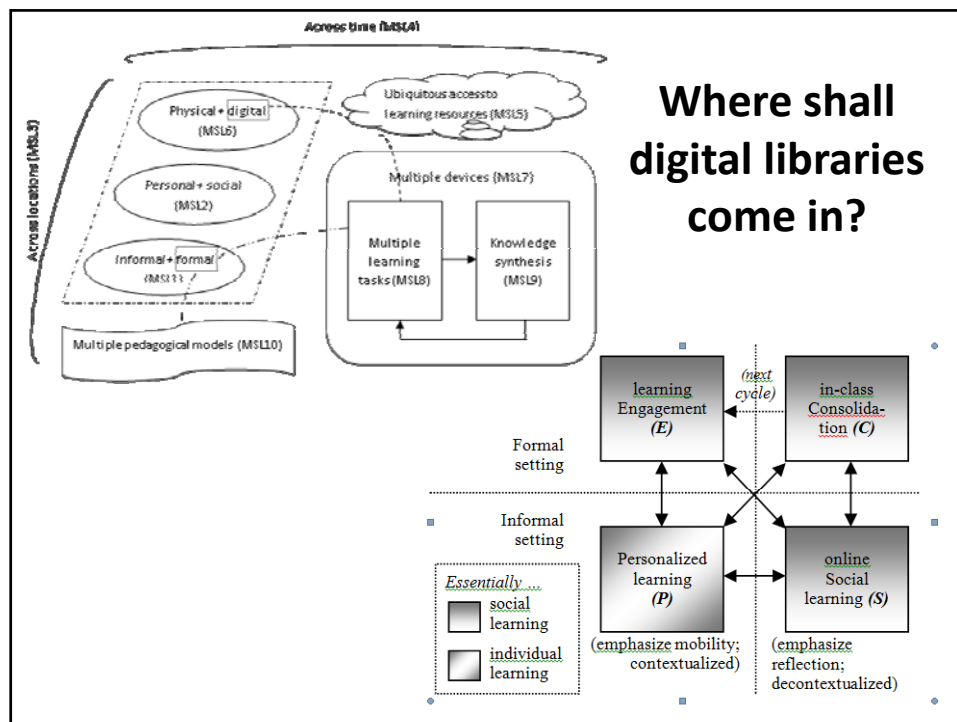
The Research Team of "Move, Idioms!"

The Research Team of MyCLOUD

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*Implications of m-learning,
u-learning, MSL
for
libraries and archives*

Slide 1

Where shall digital libraries come in?

Across time (MSL4)

Across locations (MSL3)

Physical + digital (MSL6)

Ubiquitous access to learning resources (MSL5)

Personal + social (MSL2)

Multiple devices (MSL7)

Informal + formal (MSL1)

Multiple learning tasks (MSL8)

Knowledge synthesis (MSL9)

Multiple pedagogical models (MSL10)

Formal setting

learning Engagement *(E)*

(next cycle)

in-class Consolidation *(C)*

Informal setting

Personalized learning *(P)*

online Social learning *(S)*

Essentially …

social learning

individual learning

(emphasize mobility; contextualized)

(emphasize reflection; decontextualized)

Slide 2

Learning Hub revisited
(a learner-centric view of libraries)

Library 2.0

Learner history *(public)*

Learning affordances

Learner history *(private)*

Informal settings

Formal settings

Library as a place vs. *Library as a service*

- Consider Internet as a conceptually global, but technically distributed library …
- Accessible anytime, anywhere – bringing the library to the users
- Dynamic contents and powerful search engine

Learning/referencing on demand

- Building on the argument of "knowledge vs. resources" …
- Library is only one piece of the jigsaw puzzle in a learner's learning journey
- We don't have to read a book from cover to cover anymore (a la context-aware information pull)
- Books are no longer the "unit of references"
  - Linkages between books are perhaps more important than "achieving comprehensiveness" in reading an entire book

The age of *prosumer* & the age of personalization

- Information is no longer flowing one way
- Library 2.0!
- Users contribute self-generated resources to the library, and annotate/discuss about the existing resources; linking relevant resources
- "Library wellness"? The need of building a healthy "library culture"
- Building your own library & resource-base
  - e.g., "learner history" in the "learning hub model"; Mictonary

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The End … is a New Beginning!
吾生也有涯，而知也無涯

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