



通過探究式學習模型來最小化教師和學生之間的差距
Through Inquiry-based Learning Model to Minimize the Distance between Teachers and Students



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San Diego, CA
29/1/2013 5:29pm



“Students at all grade levels and in every domain of science should have the opportunity to use scientific inquiry and develop the ability to think and act in ways associated with inquiry. (*National Science Education Standards*, National Research Council, 1996, p. 105)

Challenges of Inquiry-based Learning

- Addressing the Challenges of Inquiry-Based Learning Through Technology and Curriculum Design. *The Journal of the Learning Sciences*, 8(3&4), 391-450
 - Daniel C. Edelson, Institute for the Learning Sciences and School of Education and Social Policy, Northwestern University
 - Douglas N. Gordin and Roy D. Pea, Center for Technology in Learning SRIO, International

THE JOURNAL OF THE LEARNING SCIENCES, 8(3&4), 391-450
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Addressing the Challenges of Inquiry-Based Learning Through Technology and Curriculum Design

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Inquiry experiences can provide valuable opportunities for students to improve their understanding of both science content and scientific practices. However, the implementation of inquiry learning in classrooms presents a number of significant challenges. We have been exploring these challenges through a program of research on the use of scientific visualization technologies to support inquiry-based learning in the geosciences. In this article, we describe 5 significant challenges to implementing inquiry-based learning and present strategies for addressing them through the design of technology and curriculum. We present a design history covering 4 generations of software and curriculum to show how these challenges arise in classrooms and how the design strategies respond to them.

Students at all grade levels and in every domain of science should have the opportunity to use scientific inquiry and develop the ability to think and act in ways associated with inquiry. (*National Science Education Standards*, National Research Council [NRC], 1996, p. 105)

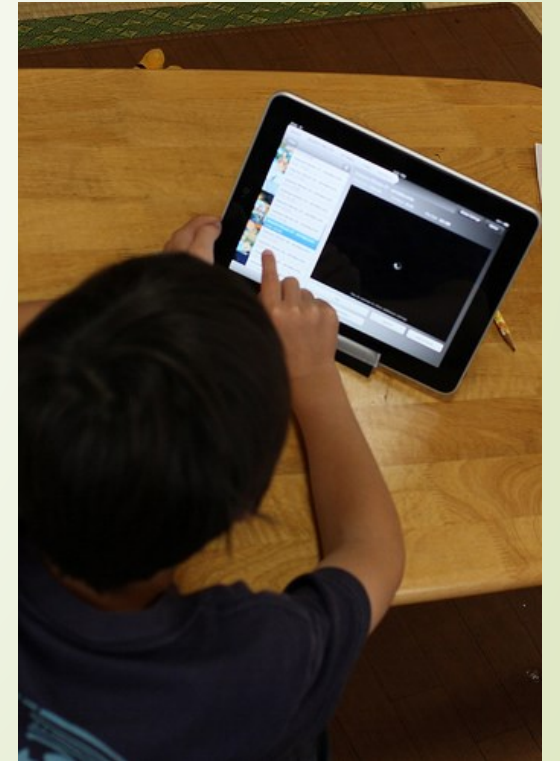
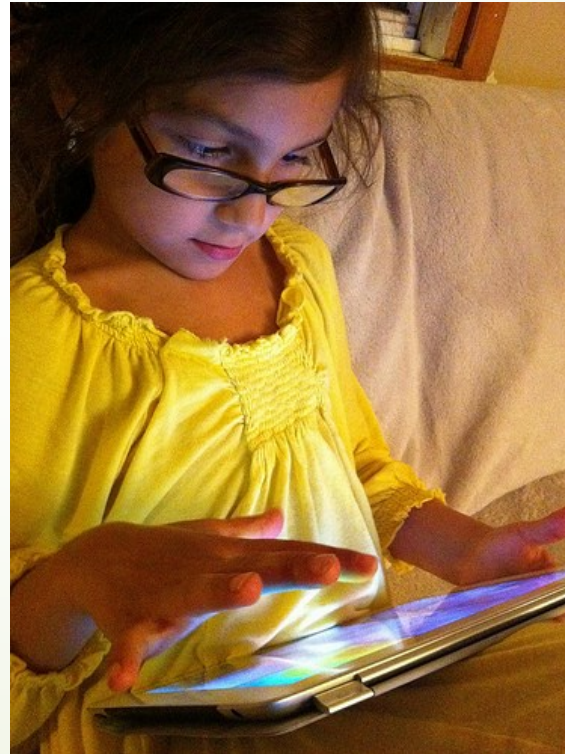
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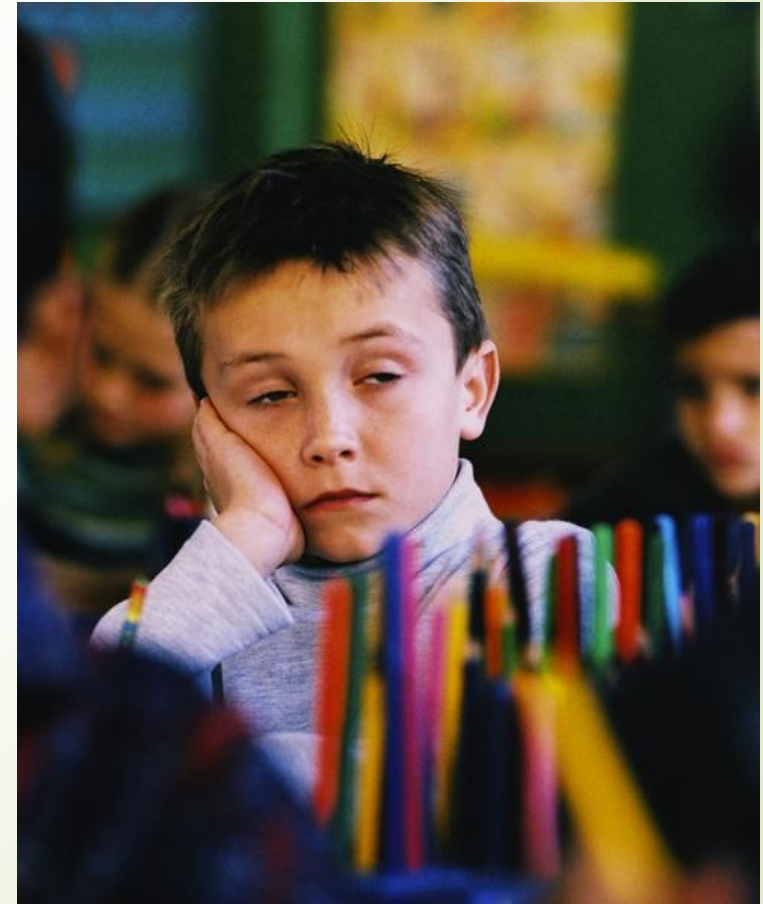
Insights about Inquiry-Based Learning in Sciences

- Inquiry experiences -> valuable opportunities
- Science
 - Question-driven, open-ended process
 - Must have personal experience with scientific inquiry to understand this fundamental aspects of science
- Challenging to implement in classrooms
- “**Computer technologies** are receiving increased attention from the science education community because of **excitement** about their **potential** to **support new forms of inquiry**.”

“These two reform trends are coming together in the form of numerous projects to create designs for technology-supported, inquiry-based science learning.”

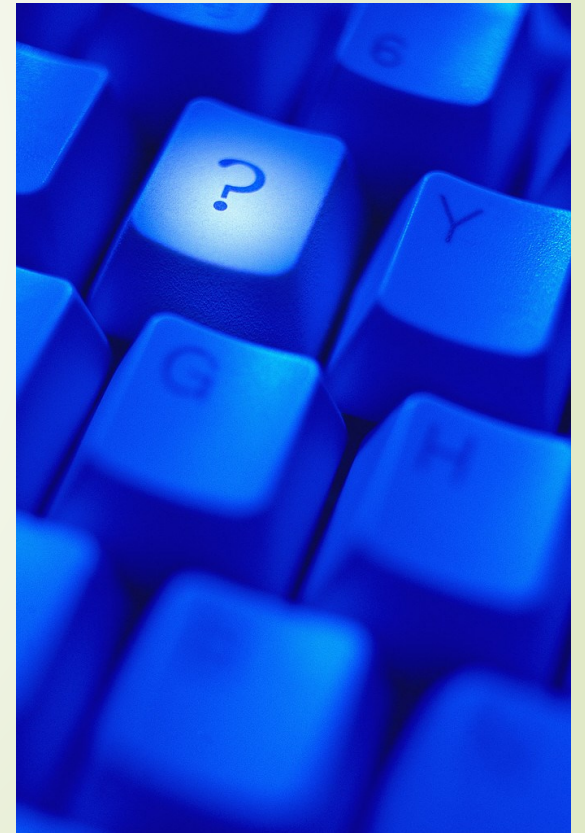


?? RELATIONSHIPS WITH THE LEARNERS??



Questions to Consider

- Can we build a **better relationship** between the students and the teacher in a classroom setting?
- How can the **computing technology** help reduce the distance?





Powerful Devices





How powerful a mobile phone is?

- Wireless connection to the internet
- Various network applications
 - Social networking apps (Whatsapp, Facebook, Twitter, WeChat, QQ, LinkIn, Skype...)
 - Books (iBooks by Apple, Kindle by Amazon...)
 - Cloud storage (Dropbox, Google Drive, SkyDrive...)
 - Learning (iTunes U, Coursera, TED Talks...)
 - Newspaper, emails, video/photos/voice, database...etc.
- Affordable price for mobile devices, software system, and network services (cellular and WiFi)

How popular of mobile phones?

Rank	Country	# of Mobile Phones (in million)
1	China	986
2	India	894
3	United States	290
4	Indonesia	250
7	Japan	133
17	United Kingdom	82
27	South Korea	53
55	Hong Kong	15
57	Cambodia	14

CIA (2011): <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2151rank.html>, USA

Mobile services in hong kong

Telecommunications Services	Quantity
Mobile network operators (February 2013)	5
Local fixed network operators (February 2013) ^(Note 6)	18
External fixed telecommunications services providers (February 2013) ^(Note 7)	284
- Facility-based external fixed network operators (February 2013) ^(Note 8)	41
- Services-based external telecommunications services providers (February 2013) ^(Note 9)	243
Residential fixed line penetration rate (December 2012) ^(Note 10)	100.79%
Mobile subscriber penetration rate (December 2012)	228.5%
Mobile subscribers (December 2012)	16,403,076
2.5G and 3G/4G mobile subscribers (December 2012)	10,073,352
Internet Services	Quantity
Internet service providers (February 2013) ^(Note 11)	191
Registered customer accounts with dial-up access (estimated) (December 2012)	793,811
Registered customer accounts with broadband access (estimated) (December 2012)	2,264,545
Household broadband penetration rate (December 2012)	86.1%
Public Wi-Fi access points (February 2013)	18,824

- [China Mobile Hong Kong Company Limited](#)
- [CSL Limited](#)
- [Hong Kong Telecommunications \(HKT\) Limited](#)
- [Hutchison Telephone Company Limited](#)
- [SmarTone Mobile Communications Limited](#)

Checklist: Are we ready for mobile learning?

- ✓ Systems and Services
 - ✓ Availability
 - ✓ Accessibility
 - ✓ Compatibility
 - ✓ Mobility
 - ✓ Portability
 - ✓ Penetrability

- ✓ Hardware technology
- ✓ Software technology
- ✓ Wireless network Infrastructure
 - ✓ Cellular Coverage (Near 100% in Hong Kong)
 - ✓ Wi-Fi Access Point (Generally good reception in each classroom/lecture hall)
- ✓ Ownership (All students and teachers have access to mobile devices)

How about the IT literacy of our students and teachers?

What are some available platforms?

- ▶ Learning management system (LMS)
 - ▶ Moodle (51%)
 - ▶ Blackboard (19%)
 - ▶ Desire2learn (11%)
- ▶ Interactive teaching platform
 - ▶ Edmodo (<http://www.edmodo.com>)
 - ▶ Canvas (<https://canvas.instructure.com>)
 - ▶ Schoology (<https://www.schoology.com/home.php>)

“Bring your own device”

- Bring Your Own Device (BYOD)
 - Literally, students bring their own mobile devices to school
 - Mobile devices: smartphones, tablet computers, laptops
 - Complete their taste during the class period or outside of the classroom
- Interactive classroom teaching with BYOD
 - Ask questions
 - Gather opinions
 - Carry out discussions
 - Provide feedbacks
- Benefits students, then benefit teachers; **not vice versa!**



Demo: edmodo

- Ged1003 Mathematics Across Cultures and Time
 - Lecture topic: **Philosophical and Scientific Dimension of Mathematics**
 - Number of students: **40**
 - Background: **varied across different programmes**
 - Outcomes: **describes scientific phenomenon with mathematical approach**
- Teaching & learning activities
 - **Real-time Polling**
 - **Group Discussion**



Classroom Teaching (Demo)

Bring your own device LECTURE Short ver

File Edit View Window Help

Bring your own device for
Reflective Engagement

The Hong Kong
Institute of Education
香港教育學院

Department of
Mathematics and
Information Technology

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PREPRATION PROCESS



- ▶ Stage 1: prepare myself to use
 - ▶ Be committed to master the skills
 - ▶ Read instruction manual
 - ▶ Discuss with colleagues who have experience
 - ▶ Set aside sufficient time to test and trial
 - ▶ Create another account to act as students
 - ▶ Plan the lesson and activities to meet the learning outcomes
- ▶ Stage 2: Prepare students to use
 - ▶ Email and instruct them to install before the next lecture
 - ▶ Provide follow-up instructions after observation
 - ▶ Give a sample activity to test their understanding and readiness
- ▶ **STAGE 3: PREPARE THE SYSTEM AND NETWORK**
 - ▶ Check with the personal mobile devices to be ready
 - ▶ Check with the Wi-Fi connection in the classroom



Challenges and opportunities



- Take more time to prepare myself for the technology
- Take more time to prepare the lessons
- Take more time to prepare the students
- Take more time to teach during the classroom

- Collect more feedbacks from the students during the classroom
- Provide more interactions among students, and between students and teachers
- Bring in more excitement and enjoyment to the classroom
- Motivate more students to engage



Conclusions from personal experience

- BYOD itself cannot bring success; with teacher's well preparation, it will. BYOD model is ready to be implement.
- Teachers must be fully committed to LEARN the skills first before THINK and APPLY.
- **Students are ready** in general with clear instructions of using e-Learning platforms.
- Teaching with or without technology can be successful.
- But, teaching with technology will make a difference in the classroom.
- Increase the interactions with students
- More **dialogues** when we **EXPLORE together** with the **technology**

Q&A

