

Doing Small Scale Research Experience Sharing

**Implementation of ICT in chemistry
classrooms: A Case Study**

**FONG Wai-hung, Raymond
whfong@hkstar.com**

How to Start?

- **Personal belief: using ICT for teaching and learning is educational valuable**
- **Personal perception: there are many educational policies believed to be sound but do not get implemented**
- **Personal interest: teaching and learning activities happening in classrooms**
- **Personal ambition: to acquire some knowledge and skills related to qualitative research methodology**



Research Questions

- **How do contextual factors influence chemistry teachers' use of ICT in teaching and learning?**
- **How do teachers' assumptions and beliefs about chemistry education influence their use of ICT in teaching and learning?**
- **How does school ICT leadership and support influence chemistry teachers' use of ICT in teaching and learning?**



Literature Review

- **Use of ICT in**
 - Education (3T model, CAL, ...)
 - Teaching and learning of science, with due emphasis on studies in Hong Kong
 - 1980 to 2000, Worldwide to Hong Kong, etc.
- **Educational Change Models:**
 - Fullan's model
 - Hall's CBAM model
- **Influence of leadership and support on implementation of ICT**



Information Source

- **Library**
 - **Books and journal (hard copies)**
 - **Virtual private network – online databases**
- **Internet**
 - **Reference articles**
 - **ERIC, BEI, ... → Book (Educational Change)**
 - **SITE**
 - **EMB**
 - **HKACE**
 - **Keyword search on the Internet**



Fullan's Model (1)

- **Characteristics of change**
 - **Need and Relevance**
 - **Clarity**
 - **Complexity**
 - **Quality and Practicality**
- **Characteristics at the school district level;**
 - **The history of innovative attempts**
 - **The adoption process**
 - **Central administrative support and involvement**
 - **Staff development (in-service) and participation**
 - **Time-line and information system (evaluation)**
 - **Board and community characteristics**



Fullan's Model (2)

- **Characteristics at the school level;**
 - **The principal**
 - **Teacher-teacher relations**
 - **Teacher characteristics and orientations**
- **External Factors**
 - **Government and other agencies**
 - **External assistance.**
- **Select some factors from the above list and use them as foci of study ☹️**



Concerns-based Adoption Model

- **Innovation Configuration (IC)**
 - The innovation configuration attempts to describe the innovation itself and the different operational patterns that result from the adaptation of its components by individuals and institutions. A common approach is to use an IC component checklist (simply a table).



Concerns-based Adoption Model

- **Stages of Concern (SoC)**
 - **0 Awareness**
 - **1 Informational**
 - **2 Personal**
 - **3 Management**
 - **4 Consequence**
 - **5 Collaboration**
 - **6 Refocusing**



Concerns-based Adoption Model

- Levels of Use (LoC)

- 0 Nonuse
- I Orientation
- II Preparation
- III Mechanical Use
- IVa Routine
- IVb Refinement
- V Integration
- VI Renewal

- **Not much have been done with LoC.**



Factors that affect the implementation of ICT in schools

- access to computers;
 - availability of software;
 - self-motivation;
 - confidence and skill;
 - the amount of time available for software review and teacher preparation;
 - priority of computer use in the school;
 - availability of hardware;
 - attitudes of administrators; and
 - teacher education and training (Krysa, 1998)
-
- **Generate questions for interview / foci of observation.**



Methodology

- Carr and Kemmis describe three basic forms of educational research
 - Positivist
 - Interpretative
 - Critical (Merriam, 1998)
- Patton (1990) described a logical dichotomy of two competing research methodologies
 - Logical-positivism
 - Phenomenological inquiry



Justification for Using Qualitative Inquiry Methodology

- **Qualitative inquiry, which focuses on meaning in context, requires a research methodology that is sensitive to underlying meaning when gathering and interpreting data. The best research instrument that fits the aforesaid requirements is a well-trained researcher with a very good understanding of the rationale of study, research questions involved and what data to be collected (Merriam, 1998).**



Sampling

- A funnel approach rather than a modified analytic induction approach
- A purposeful sampling strategy → Extreme case (Wiersma, 2000)
- I enjoy a lot to work on the extreme case. I am lucky to find such a case. 😊



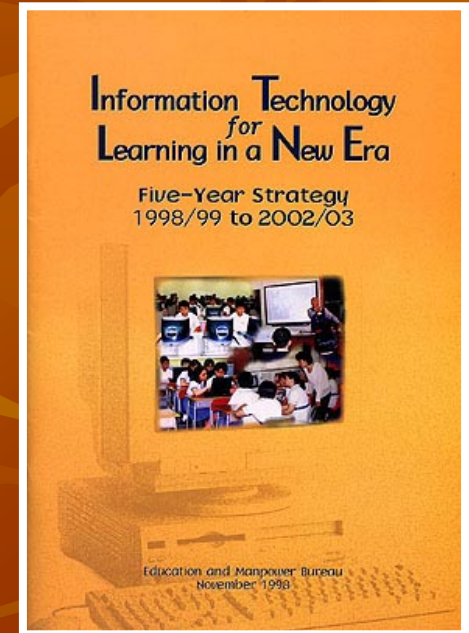
Research Tools

- Classroom observations
- Interviews with teachers and the principal
- Scrutinizing formal documents of the school (school plans, web pages, intranet)



Qualitative Data Analysis

- The data collected were analyzed using
 - SWOT model
 - Strength, Weakness, Opportunity and Threat
 - Four key elements suggested in the “Five-year IT Strategy”
- **It is important to structure the data analysis in some way.**



Findings #1

- **Putting more exercises on-line in the summer for students**
- **More Q&A with students through e-mails**
- **Putting digital photos of students' behavior at practical session on LCD projector for students to discuss/reflect**
- **Using network for posting pre-lesson notice and post-lesson summaries/notes**



Findings #2

1. There is a need to have a good ICT infrastructure to support the use of ICT in teaching and learning processes. (+)
2. The use of intranet and internet technology as a communication tool to promote quality of teaching and learning is perceived to be a good way to use ICT. (+)
3. Teachers' beliefs and perceptions about the use of ICT have significant impact of their ICT use. (+)
4. The use of ICT in teaching and learning processes needs systematic planning. (+)
5. The involvement of students to provide ICT support to teachers and to deliver training courses to fellow students is a good idea. (+)
6. *The use of ICT in laboratory practical work, a worthwhile teaching and learning strategy, is not explored in the school. (-)*



**Contextual
Factors**

Leadership

Implementation

**Teachers' Beliefs,
Assumptions and
Knowledge**



My Strategies

- **Control yourself – discipline**
- **Develop and follow a “good” plan**
- **Prioritize your work – ABC List**
- **Use mind maps to focus your work – Use some thinking strategy you like**

學而不思則罔、思而不學則殆（孔子）

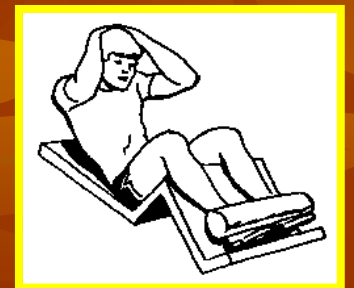
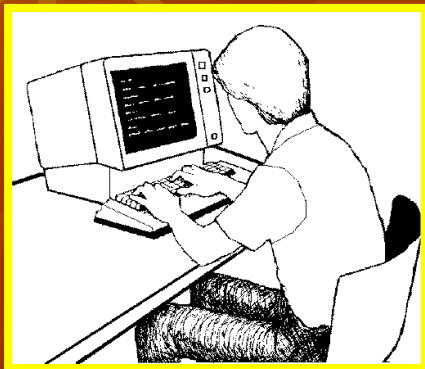
Learning without thought is labor lost;
thought without learning is perilous
(Confucius)



ABC lists

- The **A** list includes things that must get done today.
- The **B** list consists of things that should only be done if everything on the A list gets done.
- The **C** list consists of things that should only be considered after everything on the A and B list has been accomplished.
- **Trap:** The most important tasks, which often are not the fun ones, are kept getting put off.





Prior Planning Prevents Pretty Poor Performance

- Setting up a work schedule on your calendar.
- Allow time for a well rounded life, but be sure to keep academics first.



5W 1H or 9W

Behavior-Pattern	Plan	Want	Action
Communication			
Subject	WHY?	WHO?	(W)HOW?
Time & Space	WHEN?	WHAT?	WHERE?
Object	WHICH?	WHOSE?	WHOM?

MANDARIX



The background of the slide is a solid orange-brown color with a pattern of stylized, semi-transparent autumn leaves in various shades of brown and orange. The leaves are scattered across the frame, creating a textured, seasonal feel.

Thank You

Comments! Suggestion!

Case Study Report

■ Notice board 佈告板 – Many to Many

The screenshot displays the '佈告板' (Notice Board) interface of the SKH Tsang Shiu Tim Secondary School Intranet System. The page features a blue header with the school's logo and name, a 'Time Left' indicator showing 14:57, and navigation icons for Home, Refresh, and Help. A left sidebar contains '互動通訊' (Interactive Communication) and '個人設定' (Personal Settings) sections. The main content area includes a filter bar with '類別: 學科' (Category: Subject) and '佈告板: -----' (Notice Board: -----) dropdown menus. Below this, a '佈告板' section lists four categories of notices, each with a document icon and a circular indicator showing unread items:

Category	Unread	Total
F.4 Chemistry	11	14
F.5 Chemistry	1	1
F.6 Chemistry	10	10
F.7 Chemistry	0	0

A '返回' (Return) button is located at the bottom right of the notice board section.



ICT – Notice Board

佈告板



F.4 Chemistry

類別: 學科

佈告板: F.4 Chemistry

佈告板: F.4 Chemistry

日期: 2002-06-09 20:36:56

張貼者: 潘廣祥

2000 F.4 Final Examination

Attached please find the questions and answers for Section B of 2000 F.4 Final Examination. Hope they are useful for you to prepare for the examination. Good luck and God bless you.

Attachments:

Questions: 2000f4.pdf

Answers: 2000f4a.pdf

 [2000f4a.pdf](#)  [2000f4.pdf](#)



前頁



後頁



返回



ICT – Notice Board

佈告板



F.5 Chemistry

類別: 學科

佈告板: F.5 Chemistry

佈告板: F.5 Chemistry

日期: 2002-03-25 19:48:10

張貼者: 潘廣祥

Emulsification

See the flash file on emulsification. See whether you understand the chemical principle behind.

 [emulsification.swf](#)



後頁



返回



ICT – Notice Board

佈告板



F.6 Chemistry

類別: 學科

佈告板: F.6 Chemistry

佈告板: F.6 Chemistry

日期: 2002-05-22 12:07:52

張貼者: 潘廣祥

Interesting articles in Chinese Science Journals

You may find the following articles interesting. This journal can be found in the library.

期刊一 科學24小時

邢乃文 錄一 第一種被填補周期表空位的元素 p.14

楊先碧 疲勞的金屬 p.15



ICT – Discussion Forum

- Discussion Forum 討論區 – Many to Many

討論區

主題	日期	作者
question 3	2002-06-01 19:35:04	胡慧華
☀ Re: question 3	2002-06-03 09:05:27	陳朗暄
☀ Re: question 3	2002-06-03 23:00:46	林志強
question 2	2002-06-01 19:30:55	胡慧華
Re: question 2	2002-06-03 23:02:44	林志強
☀ question1	2002-06-01 19:29:02	胡慧華
☀ Re: question1	2002-06-03 17:03:21	何惠儀
☀ CE 分數	2002-05-19 22:00:23	胡愷恩
☀ Re: CE 分數	2002-05-21 23:08:24	林志強

主題 : question 2
日期 : 2002-06-01 19:30:55
作者 : 胡慧華
內容 : is all ionic compound conduct electricity?
if the compound is insoluble, can it conduct
electricity in molten state?



ICT – Discussion Forum

■ Threaded discussion

Ammonium ion	2002-04-27 11:37:15	譚柏然
Re: Ammonium ion	2002-04-27 18:12:10	潘廣祥
Re: Ammonium ion	2002-04-29 16:14:36	譚柏然
Re: Ammonium ion	2002-04-30 10:58:53	潘廣祥
Re: Ammonium ion	2002-04-30 12:42:35	譚柏然
★ Conductivity	2002-04-26 23:03:00	郭婉婷
★ Re: Conductivity	2002-06-07 22:09:54	潘元文
★ Conc. HNO3	2002-04-26 23:01:19	郭婉婷
★ Re: Conc. HNO3	2002-04-26 23:34:11	胡愷恩

主題：Re: Ammonium ion
日期：2002-04-30 12:42:35
作者：譚柏然
內容：O thanks.
That means NH_4^+ is a stronger oxidizing agent than H^+ .. well, by the way, what's the position of NH_4^+ in the electrochemical series? Is it very strong?

