<table>
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<th>Doing Small Scale Research Experience Sharing - Implementation of ICT in chemistry classrooms: A Case Study</th>
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<tr>
<td><strong>Author(s)</strong></td>
<td>Fong, RWH</td>
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<td>2002</td>
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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.
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)
The data collected were analyzed using SWOT model. The SWOT model includes Strength, Weakness, Opportunity and Threat. Four key elements suggested in the “Five-year IT Strategy” are important.

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

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.

http://www.edinboro.edu/cwis/acaff/suppserv/tips/CAT24TP2.html
### 5W 1H or 9W

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<th>Plan</th>
<th>Want</th>
<th>Action</th>
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<tr>
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<td>WHO?</td>
<td>(W)HOW?</td>
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<tr>
<td>Subject</td>
<td>WHEN?</td>
<td>WHAT?</td>
<td>WHERE?</td>
</tr>
<tr>
<td>Time &amp; Space</td>
<td>WHICH?</td>
<td>WHOSE?</td>
<td>WHOM?</td>
</tr>
</tbody>
</table>

**Mandarix**
Thank You

Comments! Suggestion!
Case Study Report

- Notice board 佈告板 – Many to Many
ICT – Notice Board

F.4 Chemistry

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:
Answers: 2000f4a.pdf

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

emulsification.swf
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 錦一 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

![Discussion Forum Table]

- question 3
- Re: question 3
- Re: question 3
- question 2
- Re: question 2
- Re: question 1
- Re: question 1
- CE 分數
- Re: CE 分數

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

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>Ammonium ion</td>
<td>2002-04-27 11:37:15</td>
<td>謝柏然</td>
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<tr>
<td>Re: Ammonium ion</td>
<td>2002-04-27 18:12:10</td>
<td>潘廣祥</td>
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<tr>
<td>Re: Ammonium ion</td>
<td>2002-04-29 16:14:36</td>
<td>謝柏然</td>
</tr>
<tr>
<td>Re: Ammonium ion</td>
<td>2002-04-30 10:58:53</td>
<td>潘廣祥</td>
</tr>
<tr>
<td>Re: Ammonium ion</td>
<td>2002-04-30 12:42:35</td>
<td>謝柏然</td>
</tr>
</tbody>
</table>

* Conductivity
  * Re: Conductivity | 2002-06-07 22:09:54 | 潘元文  |

* Conc. HNO3
  * Re: Conc. HNO3 | 2002-04-26 23:01:19 | 鄭婉婷  |

主题：Re: Ammonium ion
日期：2002-04-30 12:42:35
作者：謝柏然
内容：O thanks. That means NH4+ is a stronger oxidizing agent than H+. well, by the way, what's the position of NH4+ in the electrochemical series? Is it very strong?