

FROM CHEMISTS ONLINE TO THE 'CHEMISTS ONLINE' SELF- STUDY AWARD SCHEME

Lok Sin Tong Young Ko Hsiao Lin Secondary School

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Situation : Differences between Schools and Universities

Schools	Universities
Lessons <i>(generally less information loaded)</i>	Lectures <i>(generally very information loaded)</i>
Students generally rely too much on teachers instructions	Students are expected to develop an independent and inquisitive mind
Students <i>(can be inspired to cultivate interest)</i>	Subject experts <i>(can provide cutting edge knowledge)</i>
Students always answer questions to consolidate the knowledge acquired	Students are encourage to ask questions to explore on the discipline interested

Beliefs

- An **interfacing** program should be helpful.
- Students' **interests in science is stimulated** through attending a **series of seminars** delivered by university professors.
- **Questioning** should be addressed in schools which is very important both in sharpening **thinking skills** and promoting **deep learning**.

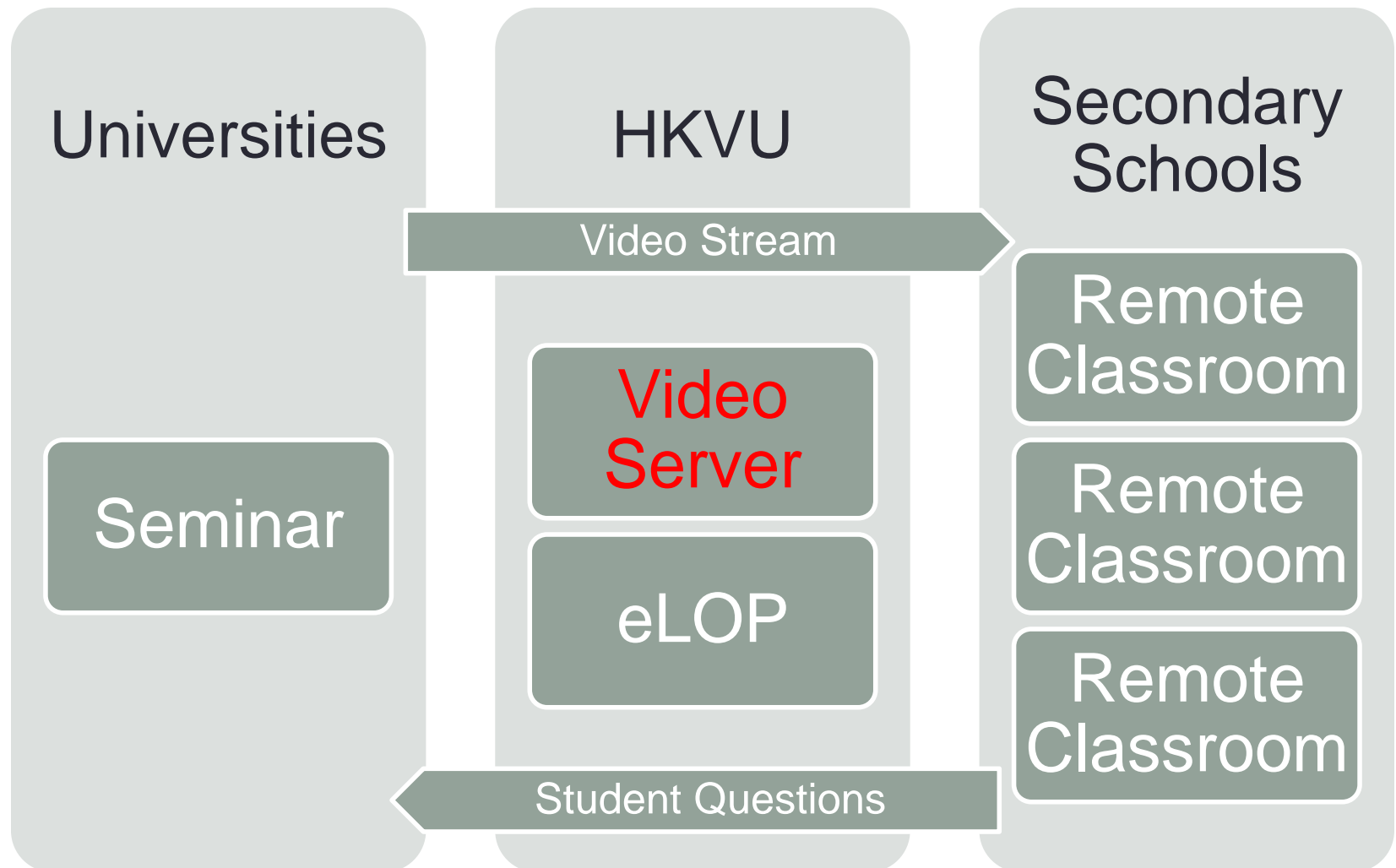
The Goal

- This is a *collaborative project* between *universities and secondary schools* in Hong Kong that aims at nurturing *scientific literacy* and *questioning skills* of secondary school students by providing them with exposure to university education through the use of *appropriate e-learning facilities*.

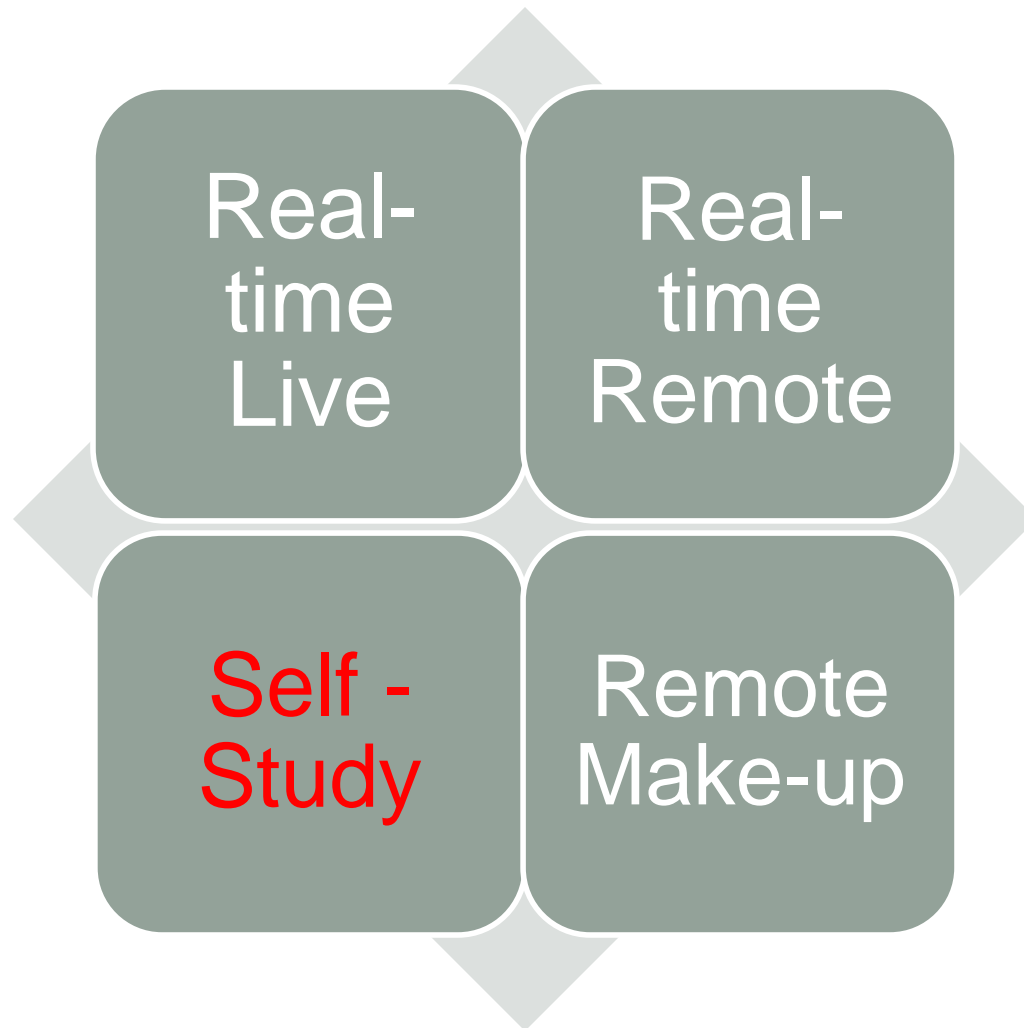
MODIFIED IMPLEMENTATION

Technical and Pedagogical Design

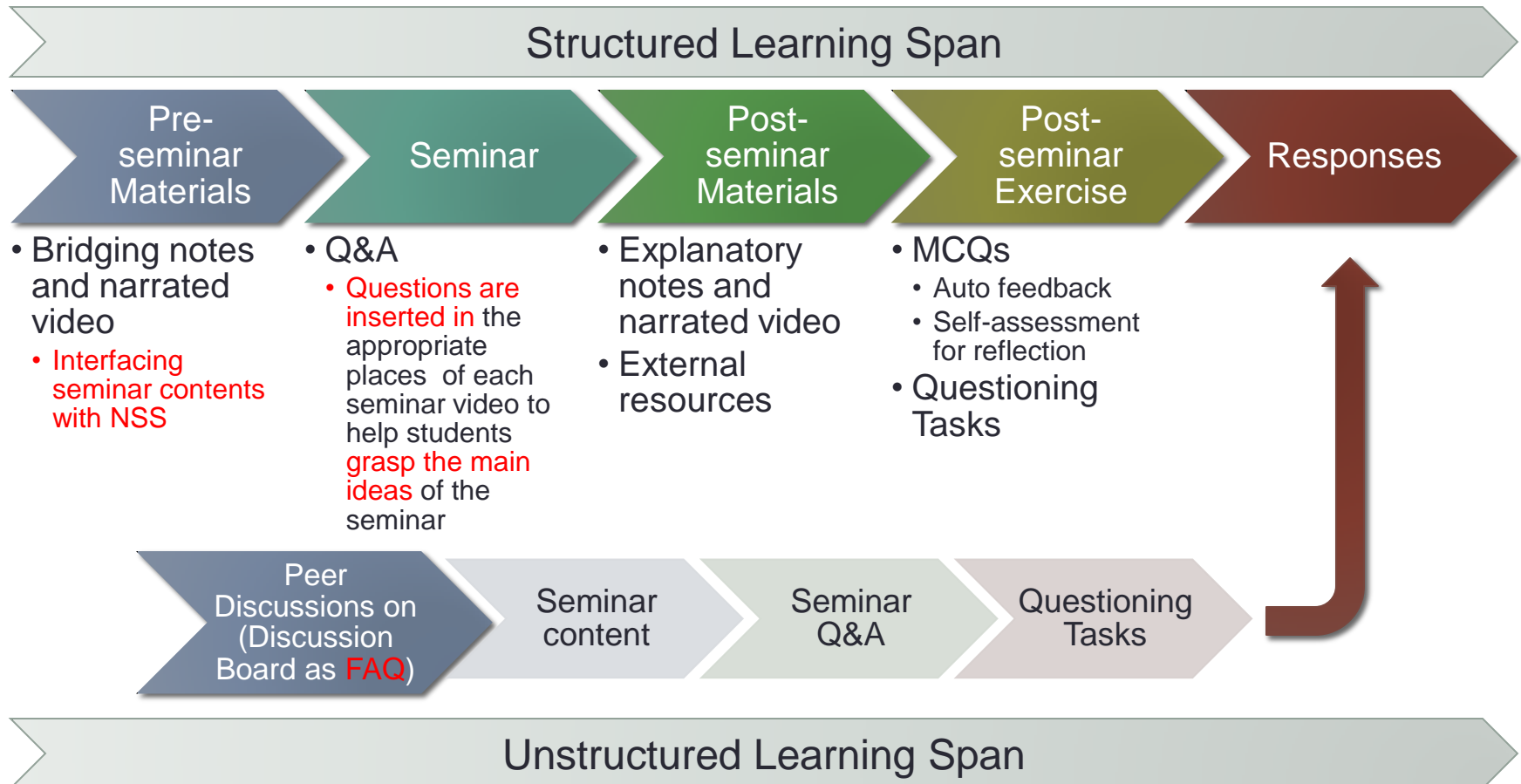
Technical Model of Seminar



Mode of Attendance



Pedagogical Design (Horizontal)



Participating Schools

Cohort 2011: 10
Cohort 2012A: 27
Cohort 2012B: 32

Total: 41
Recurrent: 20

School	2011	2012A	2012B
Australia International School Hong Kong			Y
Baptist Lui Ming Choi Secondary School	Y	Y	Y
Buddhist Yip Kei Nam Memorial College			Y
CA Cheng Wing Gee College	Y	Y	Y
Chong Gene Hang College	Y	Y	Y
CUHKFAA Chan Chun Ha Secondary School		Y	
Evangel College			Y
GT College		Y	Y
HKCCCU Logos Academy		Y	
HKSYCIA Wong Tai Shan Memorial College	Y	Y	Y
Ho Yu College and Primary School			Y
Jockey Club Government Secondary School		Y	
Lai King Catholic Secondary School		Y	Y
LST Leung Chik Wai Memorial School		Y	Y
LST Wong Chun Ming Secondary School		Y	
LST Young Ko Hsiao Lin Secondary School	Y	Y	Y
LST Yu Kan Hing Secondary School	Y	Y	
Ma On Shan St. Joseph's Secondary School			Y
Madam Lau Kam Lung Secondary School of Miu Fa Buddhist Monastery			Y
Marymount Secondary School		Y	
Methodist College			Y
POH Chan Kai Memorial College		Y	Y
Pui Ching Middle School	Y	Y	Y
Pui Ching Middle School (Macau)		Y	Y
Queen Elizabeth Secondary School		Y	
Sha Tin Methodist College		Y	Y
Shatin Pui Ying College			Y
Shatin Tsung Tsin Secondary School		Y	
Shun Lee Catholic Secondary School		Y	Y
Sing Yin Secondary School			Y
SKH Tsang Shiu Tim Secondary School	Y	Y	Y
South Tuen Mun Government Secondary School			Y
St. Margaret's Co-educational English Secondary and Primary School			Y
St. Stephen's Girls' College		Y	Y
Stewards Pooi Kei College		Y	Y
STFA Cheng Yu Tung Secondary School			Y
True Light Middle School of Hong Kong	Y		
TWGHs Mrs Fung Wong Fung Ting College	Y	Y	Y
TWGHs Mrs Wu York Yu Memorial College		Y	Y
Wa Ying College		Y	Y
Wah Yan College Hong Kong			Y

Chemists Online Seminars Topic Summary – Cohort 2011 to Cohort 2012B

No.	Topic	Speaker
1	Synthetic Polymers in Modern Life	Prof. To NGAI (CUHK)
2	A Journey to the Structural Determination of Organic Molecules: IR, MS and NMR Spectroscopy	Dr. Fuk Yee KWONG (Associate Professor, PolyU)
3	Gastronomy	Prof. Lam Lung YEUNG (HKUST)
4	Metals in Biological Systems	Prof. T C LAU (CityU)
5	Conducting Polymers	Prof. W.K. CHAN (HKU)
6	Nanomaterials for Environmental and Energy Applications	Prof. Jimmy C. YU (CUHK)
7	Colour Chemistry	Dr Vincent KO (Associate Professor ,CityU)
8	Electrochemistry	Prof. Kwok-yin WONG (PolyU)
9	Molecules for Liquid Crystals Displays	Prof. Wai Kin CHAN (HKU)
10	Water Uptake of Atmospheric Particles: From the Millikan Oil Droplet Experiment to a Blue Sky	Prof. Chak Keung CHAN (HKUST)
11	Science and the Aftermath of Fukushima Nuclear Plant Accident	Prof. W. H. CHAN (HKBU)
12	Food Chemistry and Food Safety I	Dr.. Ka-sing LEUNG (PolyU)
13	Determination of Volatile Organic Compounds	Mr Yau-tim WONG (HKAS)
14	Drug Discovery and Organic Chemistry	Dr. Kendrew MAK (Senior Instructor,CUHK)
15	Food Chemistry and Food Safety II	Dr. Ka-sing LEUNG (PolyU)
16	Symmetry, Asymmetry and Our Chiral World – A Personal Recollection on the 2001 Nobel Prize in Chemistry	Prof. Albert LEE (HKBU)
17	The Importance of Water in Food Chemistry	Dr. Vincent KO (Associate Professor,CityU)
18	Photodynamic Therapy – A Promising Strategy of Cancer Treatment	Prof. Dennis K. P. NG (CUHK)

KEYWORD BASED QUESTIONING

A Practical Approach

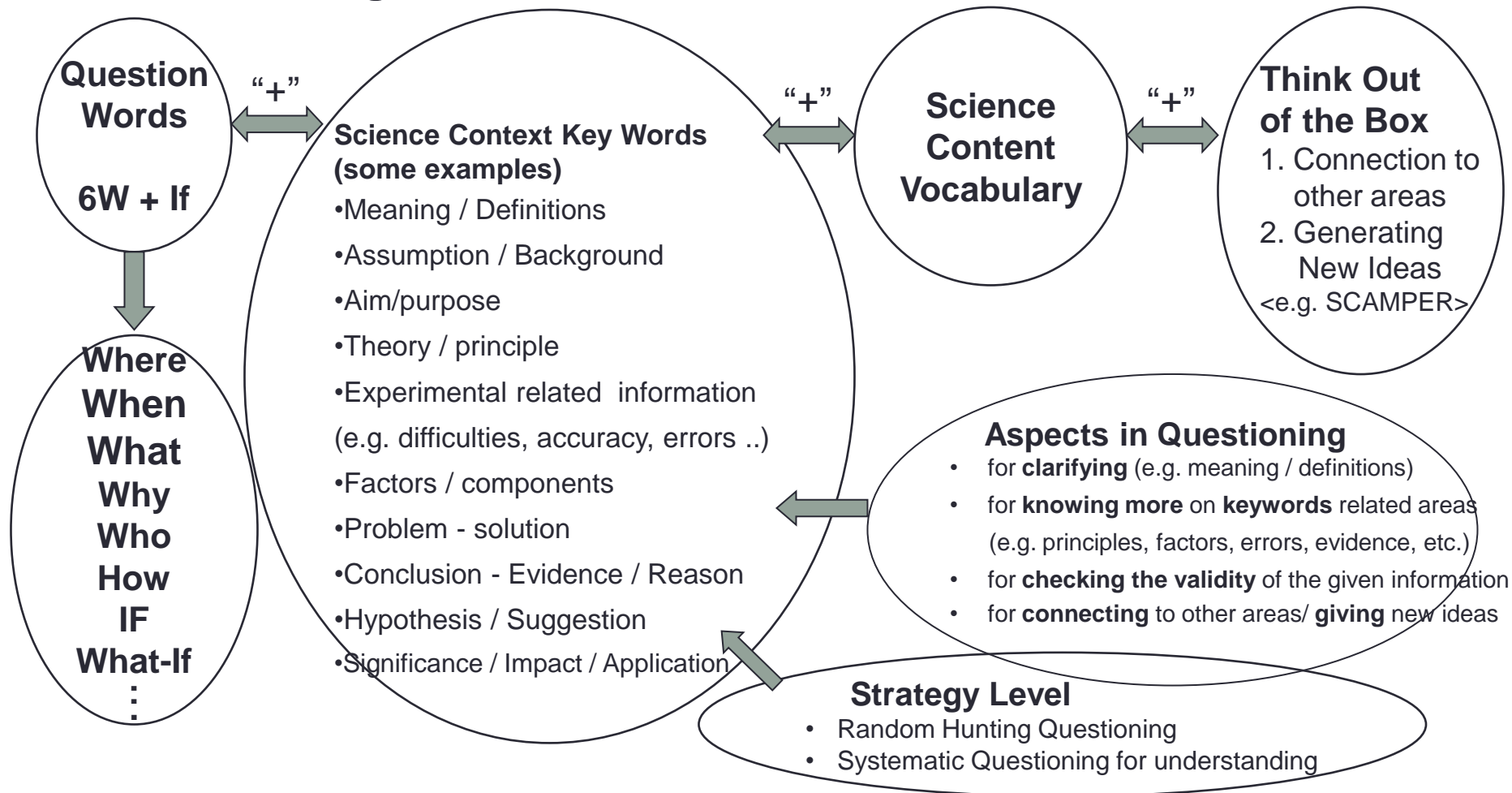
Reasons to Ask Questions

Asking questions may help deepen understanding of the messages or ideas received and help generate new ideas and knowledge

- **Clarify** the complex ideas (related to analytical thinking)
- **Assess the reasonableness** of ideas (related to critical thinking)
- **Make connections** and extensions to other disciplines or areas (related to creative thinking)

Asking Questions for Understanding & Deeper Thinking

Keyword based Questioning ---- Analytical Thinking, Critical Thinking, Creative Thinking



FINDINGS ON QUESTIONING

Statistics and Data

Attitude in Questioning

After participating in Chemists Online,

	Become more uncomfortable / worse	No change	Become more comfortable / better
are you more comfortable with asking questions in public?	10	180	181
are you more comfortable with asking questions in class?	11	180	172
how would you rate your overall questioning skills?	7	153	199

Confidence in Questioning

How would you rate your confidence on

	Become more uncomfortable / worse	No change	Become more comfortable / better
clarifying scientific ideas? (e.g., What is XXX?)	7	156	197
explaining ideas behind daily applications of chemistry? (e.g., What is the working principle of XXX?)	10	157	190
critically analyzing plausible scientific ideas? (e.g., How do you judge the existence of XXX?)	10	174	172

Effectiveness of Questioning Tasks

In terms of developing your questioning skills, how would you rate the helpfulness of

	Very unhelpful	Unhelpful	Helpful	Very helpful	No comment
keywords-guided questions in the post-seminar exercises?	15	24	234	58	44
open-ended questions in the post-seminar exercises?	8	27	211	70	57

Overview of Student Questions

	Cohort 2011	Cohort 2012A
No. of questions	1411	2016
Basic analytical-related	60%	61.3%
Advanced analytical-related	14%	12.7%
Critical-related	4%	3%
Creative-related	22%	23%

Real Samples of Notable Questions

Complex Questions

- The differences between fuel cell and solar cell are charging and the sources the energy come from. Besides that, what are the other differences?
- When electricity is passed via substance, many substances will release heat and light due to the resistance of the substances but why luminescence do not?
- How catalysts speed up a chemical reaction in terms of energy profile and what is the theory of the application of a catalyst?
- Is there any similar theory between chromophore regions and retinas?

Real Samples of Notable Questions

Question Series

- Are there some particle undergo emission? Does this emission cause the electronic transition? Does this kind of transition apply on the firefly, fluorescence and phosphor? Which kinds of energy is released form the transition?
- Except the solar energy, nuclear energy...these kinds of common ways to produce electricity or energy to us in daily life in a much environmental friendly way, are there still any way to produce electricity in a natural way that invent by scientists in previous years? what is the principle of that? Is that really useful in our daily life? Why that kinds of new way in producing energy is much more environmentally friendly?
- Expect soild and liquid, will gas like hydrogen and oxygen change colour in high temperature ? If it will change colour, which gases will change?

Thank You