



Po Leung Kuk

Tang Yuk Tien College

**Innovations
in the
Science Education Key
Learning Area**



Background



An urgent need for changes...

1. Changes on the part of students and the society of H.K.
2. **Educational reforms** (e.g. NSSC) introduced since 2002
3. Subsequent changes in **public exams**

Innovations in F.1 and F.2 curriculum



Aims

1. To provide a **school-based quality science education (優質校本科學教育)** for students by initiating changes in curriculum, pedagogy & assessment
2. To lay **a strong foundation (良好根基)** for students taking physics, chemistry and biology of the NSSC

A school-based
F.1 and F.2 curriculum

董玉娣中學
校本科學課程



Features

1. Changes in **curriculum** 課程
2. Changes in pedagogy 教學法
3. Changes in assessment 評核
4. Launching of subject related activities 課程相關活動

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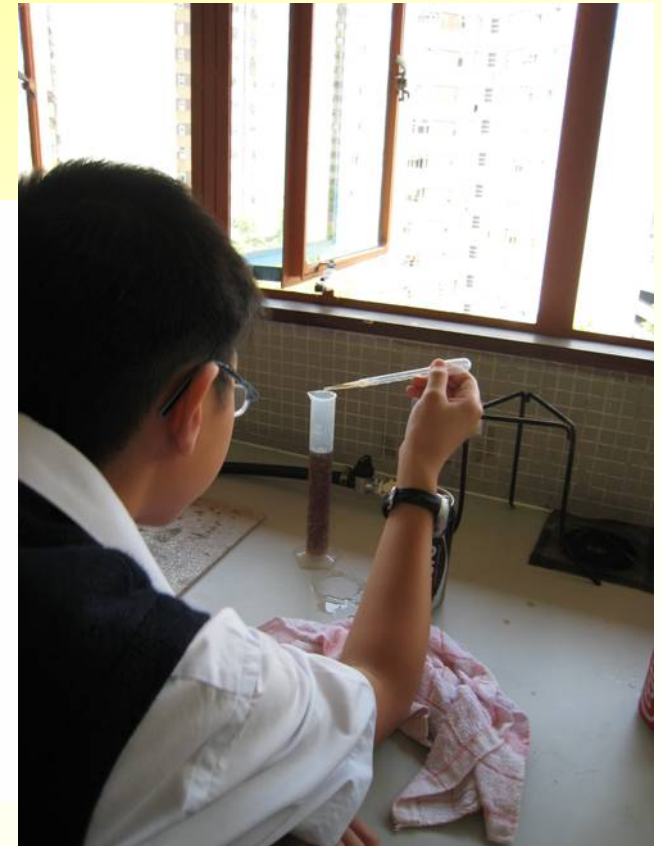
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1. Changes in curriculum

Scientific knowledge & 10 science process skills

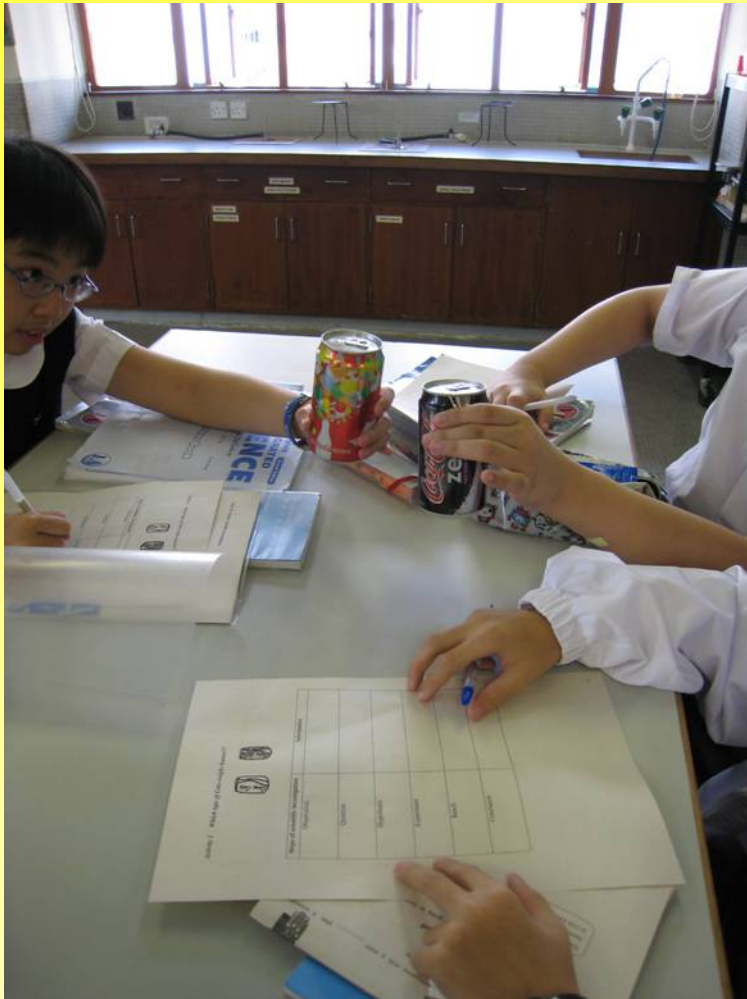
Skills ^{1b}	Unit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	a. Observing (OB)		✓	✓	✓	✓	✓	✓		✓			✓	✓	✓	✓
b. Classifying (CS)			✓				✓				✓		✓		✓	
c. Measuring (MS)		✓	✓		✓		✓		✓	✓		✓				✓
d. Handling apparatus (EA)		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
e. Communicating (CM)		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
f. Inferring (IF)		✓					✓	✓	✓	✓	✓	✓			✓	✓
g. Predicting (PD)					✓		✓	✓	✓	✓		✓				✓
h. Proposing hypotheses (HP)							✓			✓						✓
i. Interpreting data (ID)			✓		✓	✓			✓			✓	✓	✓		✓
j. Controlling variables (CV)			✓		✓			✓								



1. Initiating changes in curriculum

Hands-on & Minds-on experience

e.g.1 Which type of Coke weighs heavier?

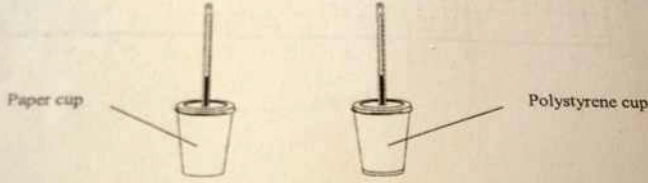


e.g.2 Which cup can keep water hot for a longer time?



Procedures:

1. Set up the apparatus as shown in the diagram.

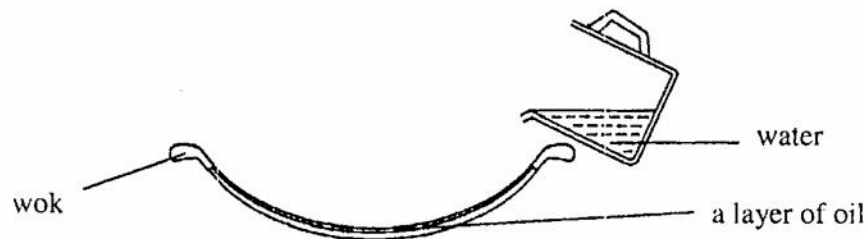


2. Pour 100 cm³ of hot water into each of the two cups.
3. Put the thermometers into two cups and wait about ten minutes. Measure the temperature of water in each cup every 1 min for 10 min.
4. Observe these two thermometers, after that analyse the temperature's different between these two cups. Record the result in the table provide.

1. Changes in curriculum

- Integration of essential generic skills (3C1P)

(c) Suppose there is a layer of oil on the inner surface of a very hot wok(鑊).



(i) If tap water is poured into the wok, will it float on the oil or sink to the bottom of the wok?

It will sink to the bottom of the wok. (1 mark)

*(ii) With reference to (a), explain why oil droplets spill out and an explosive sound is heard as tap water is added into the hot wok.

It is because when you are adding oil into the hot wok, the water will sink under the layer of oil and the water/sink on the bottom of the hot wok, it boils, it becomes gas and the layer of oil stop the gas of water go out, the particles of water push that of oil, lastly, the oil droplets spill out. (1 mark)

after
Very good
out

(iii) Do you think it is a good idea to cool a hot oil wok by pouring tap water into it? Why?

1/Unit 6/
Assignment 1/Q.4

2. Initiating changes in pedagogy

- **More student-centred and interactive** classroom situation
- **Co-construction** of knowledge (Teachers and Students)





1. Changes in curriculum

Scientific Investigation 科學探究 by F.2 students

Food Science

Food preservatives

Calcium in drinks

Vitamin C in fruits

Sugarfree &
sugar gum

Scientific Investigation 科學探究 by F.2 students

Briefing session of the project



Scientific Investigation 科學探究 by F.2 students



Presentation by students

Q and A session



Demonstration by students

**3. Initiating changes in assessment
(assignments, tests & exams)**

1. Skills of conducting a **Scientific Investigative Study**

(aim, hypothesis, fair test, variables handling, procedures writing, result, conclusion)

F.2/1st Term Test/ Section C/ Q.2

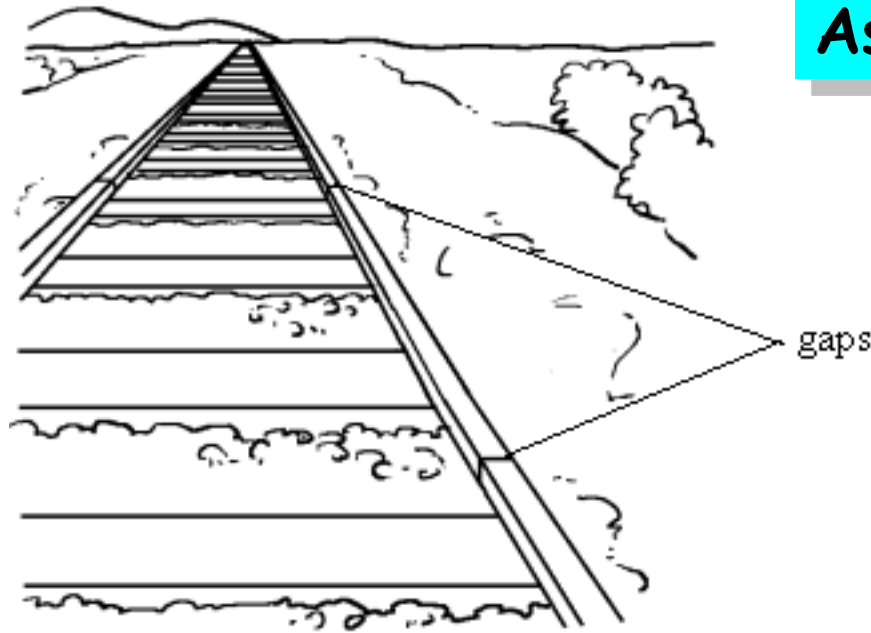
Peter wants to **compare the oxygen content of unbreathed air and breathed air**. The following apparatus are given:

Gas jar	X 2	Lighter	X 1	Burning spoon	X 1
Candle	X 2	Other common apparatus in school laboratory			

- (a) What are the **independent variables** in this experiment? (1 mark)
- (b) What are the **controlled variables** in this experiment? (2 marks)
- (c) What is Peter going to measure? (1 mark)
- (d) **Write down the procedures** for this experiment. (5 marks)
- (e) Design a table for recording the result. (1 mark)

2. Application of scientific knowledge learnt in daily life situations

3. Gaps are commonly found in a rail.



F.1/Unit 6/

Assignment 2/Q.3

- (a) What are the effects of temperature on the size of steel rails? (2 marks)
- (b) What is the use of the gaps in a rail to prevent accidents caused by these effects? (2 marks)

3. Open-ended questions

Never overlook the risk of LASIK 激光矯視

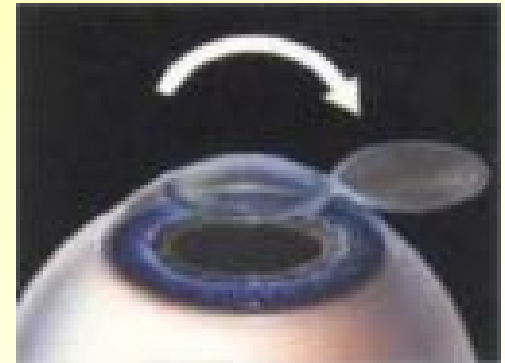
LASIK is becoming more and more popular in Hong Kong. During the LASIK surgery, the doctor first cut a flap in the cornea. Then, a laser beam is applied to change the shape of the cornea so that light rays can be accurately focused on the retina. Finally, the doctor places the flap back into position and let it heal by itself.

Although most LASIK surgeries are very effective for correcting eyesight, the surgery itself has a certain level of risk. For example, if the area of the cornea polished by the laser beam (激光) is not the same size as the pupil, blurry vision will result. If the wound on the cornea does not heal well, the vision may not be corrected completely. Besides, the wound may be infected by bacteria, or there may be scars (疤痕) left on the cornea.

According to experts, if the vision is not corrected completely in LASIK, the patient can receive an additional surgery for correction. If the vision becomes blurry, doctors can measure the area polished and the size of the pupil accurately using a special equipment. Then, a surgery can be carried out to fix the problem. However, some problems cannot be fixed by surgery, such as infection of cornea or scars left on the cornea.

F.2/Unit 11/

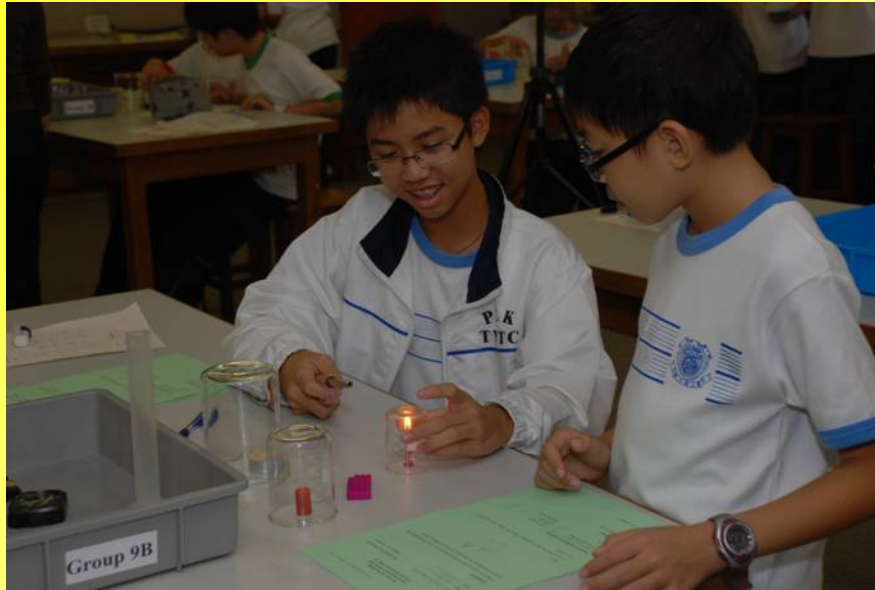
Assignment/Q.2



If you are short-sighted, what will you choose to correct your eye defect, a pair of ordinary spectacles, contact lenses or the LASIK eye surgery(激光矯視手術)? Why?

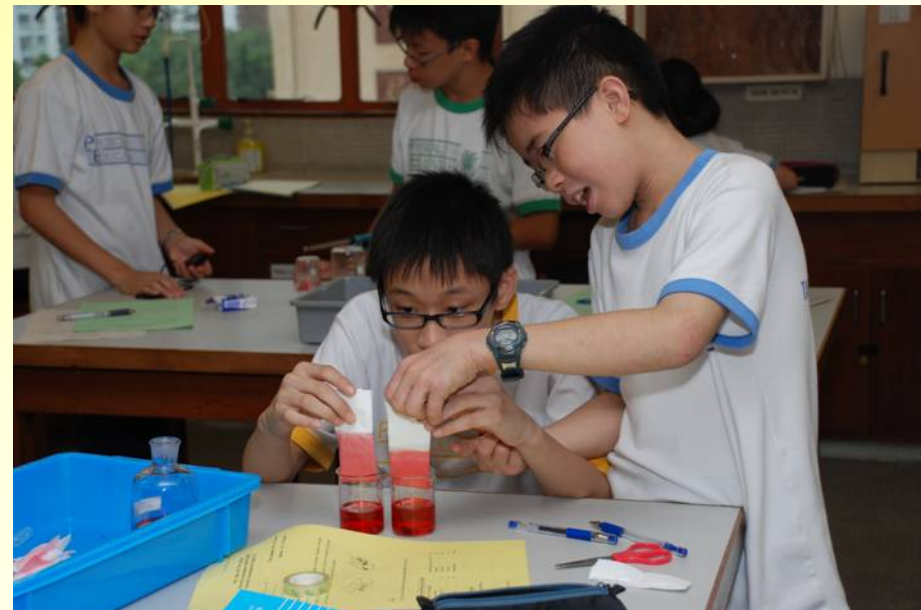
(3 marks)

4. Practical tests



40 minutes

1. Discussion +
Carry out experiment
2. Work in pair





30 minutes

1. Report writing

2. Individual work



F.2 Integrated Science/Practical Assessment/Paper B/P114

PLK Tang Yuk Tien College
Practical Assessment (2008-2009)
Scientific Investigation (Paper B)

Name: Chiu Yu Yan (D) Time allowed: 30 + 30 minutes
Class: 2E Marks: 10 + 10 marks
Date: 22-8-2008

Introduction

Candle burns to give out light and heat. During burning, it uses fuel and gas(es) and releases another gas(es). The flame goes out because of different factors.



Aim

To find out how the size of a container affects the burning time of the candle in the container.

Apparatus and Materials provided

Different sizes of container	X 3	Safety goggles	X 1
Different sizes of candles	X 3	Stopwatch	X 1
Lighter	X 1	Metre ruler	X 1
Plasticine	X 1	Measuring cylinder	X 1

Design Experiment

Discuss with your partner.

Report

Write a report by yourself.

F.2 Integrated Science/Practical Assessment/Paper B/P114

Aim (0.5 mark)

To find out how the size of a container affects the burning time of the candle in the container. ✓

Hypothesis (1 mark)

The larger size the container is, the longer burning time of the candle in the container. ✓

Apparatus and Materials provided (0.5 mark)

Different sizes of container	X 3	Safety goggles	X 1
Different sizes of candles	X 3	Stopwatch	X 1
Lighter	X 1	Metre ruler	X 1
Plasticine	X 1	Measuring cylinder	X 1

Experiment

(1) Procedures (4 marks)

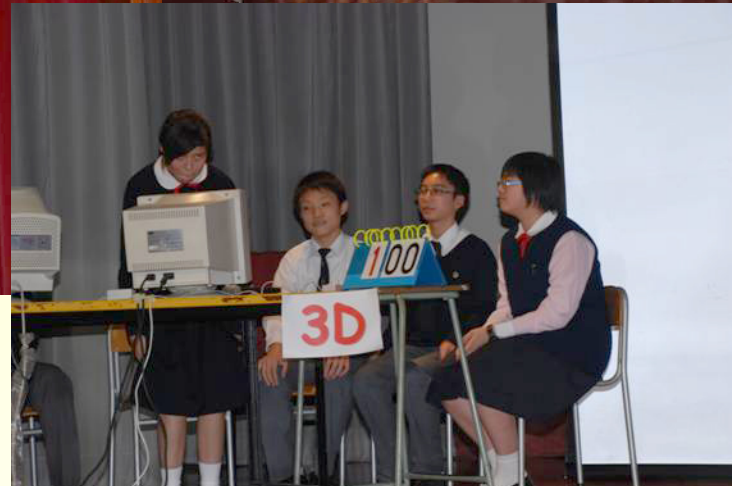
1. A lighter was used to light up the small size candle.
2. The small size container was used to cover the candle immediately.
3. A stopwatch was used to measure the burning time of the candle.
4. The lighter was used to light up the small size candle.
5. The middle size container was used to cover the candle immediately.
6. The stopwatch was used to measure the burning time of the candle.
7. The lighter was used to light up the small size candle.
8. The large size container was used to cover the candle immediately.
9. The stopwatch was used to measure the burning time of the candle.

→ Steps 1-3 were repeated with ----- (3)

Subject-related activities

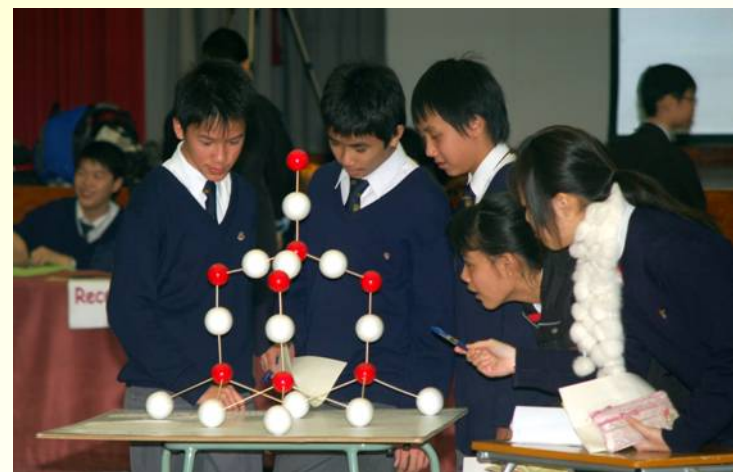
to enrich the learning experiences of students

1. Science Millionaire quiz competition



Subject-related activities to enrich the learning experiences of students

2. Chemistry Exhibition



2. Chemistry Exhibition



3. Talk by academics

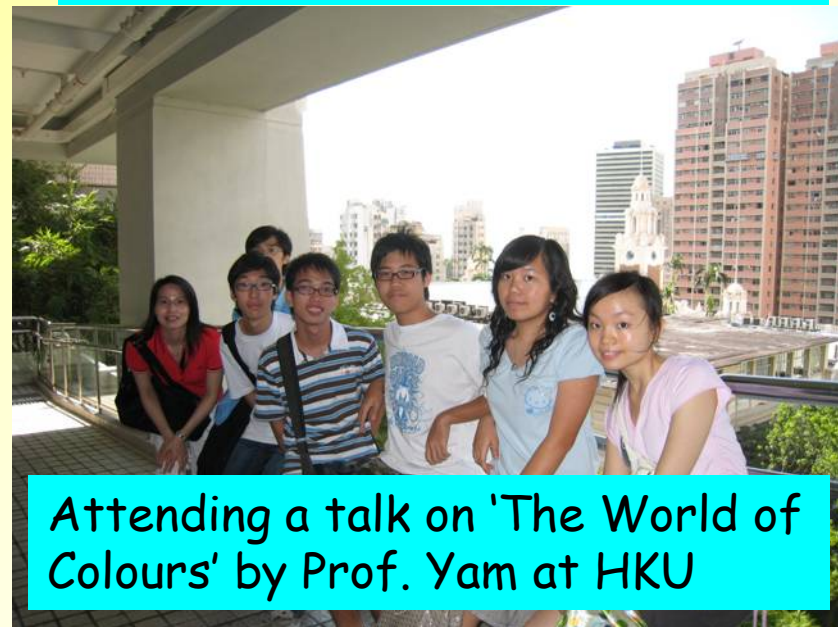
Stimulating talk on 'Alchemy' 煉金術 by Dr. Hui from CUHK



Inspiring talk on 'Mushroom' by Prof. Chiu from CUHK



Thought-provoking talk on 'Unveiling the Mystery of Earth Science' by Prof. Yim from HKU



Attending a talk on 'The World of Colours' by Prof. Yam at HKU

4. Life Wide Learning

Chemical Waste Treatment Plant



Fanling Environmental resources centre



Coca Cola Company Limited

5. Others activities launched (e.g. water rockets competition)



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Outcomes

1. More **interesting** lessons
2. More **learner independence**
3. More **confidence**

Outcomes

4. Stronger knowledge base in Science
5. Better command of the essential generic skills (3C1P)
6. Better achievement in tests & exams

Thank you very much!

