

# Learning Graphic Concepts in English

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# Background of my school

- The English standard of most of our students is average.
- The students prefer using Cantonese rather than English for learning.
- They usually resist learning IT concepts but are very interested in learning practical IT skills.



# What I will be talking about

The class is S4.

My topic today is Graphics. This topic is concerned with pure conceptual knowledge with no or very few practical IT skills.

It includes:

- differences between bitmaps and vector graphics
- technical terms such as pixel, colour depth, and resolution
- mathematical operations such as the calculation of resolution and file size.

I had difficulty in using English only.

I mainly used the PowerPoint provided by the publisher and lectured for the whole lesson.

Students highlighted key sentences in their textbooks.

Students did the textbook exercises after each sub-topic (about 10 minutes in a 60-minute lesson).

Students treated me as the Yahoo! dictionary to translate the words in the textbook or PowerPoint from English to Chinese.

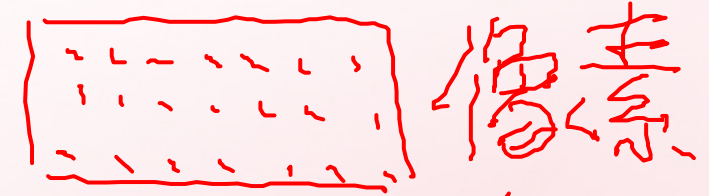
Students were very bored and were often sleepy when dealing with conceptual knowledge.

The learning environment in the classroom was very quiet with little discussion.

# 1 Digital Multimedia Elements

## Graphics

### ■ ~~Bitmaps~~



- A bitmap image is a collection of colour dots called pixels arranged in rows and columns.
- A pixel is the smallest picture element that can be shown on a computer screen.
- The number of colours can be displayed in a pixel is determined by the number of bits used to represent the pixel (known as colour depth).
- The larger the colour depth, the larger the number of colours can be displayed in the image.

色深

2 bit 00 black  
01 red  
10 blue  
11 white

∴ 1 bit → 2 colours  
2 bit → 2<sup>2</sup> colours

Less language, more visuals (static and moving)

I use simple English for the whole lesson and try to speak clearly and at a good pace.

I design my PowerPoint presentations with a few simple English words and with more visual pictures or videos to introduce the topics before the students open their textbooks.

<http://www.youtube.com/watch?v=Cc0F6jpOns0>



# HOW IS A PICTURE MADE?

What is the main element inside the picture?

*People.*

Can the picture be made more colourful rather than simply white and red?

*People could wear a different coloured shirt.*

Can the picture become clearer and more detailed?

*More people can be used to make the same picture.*



## Present the knowledge in the right sequence

I give an overview of the lesson.

I move from everyday terms to technical terms and this is designed in my PowerPoint presentations and the worksheets.

|  | Example                | Art                  | Computer graphic                |
|--|------------------------|----------------------|---------------------------------|
| What is the element in image?                | People                 | Dots                 | Pixels                          |
| How do we include colour in the image?       | No. of coloured shirts | No. of paint colours | Colour depth                    |
| How do we increase the quality of the image? | More people            | More dots            | More pixels (higher resolution) |

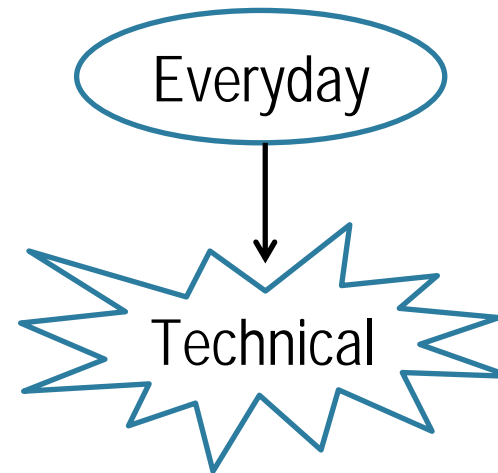
## Stay “slightly ahead” of the students’ knowledge

I break down the knowledge into manageable sub-topics.

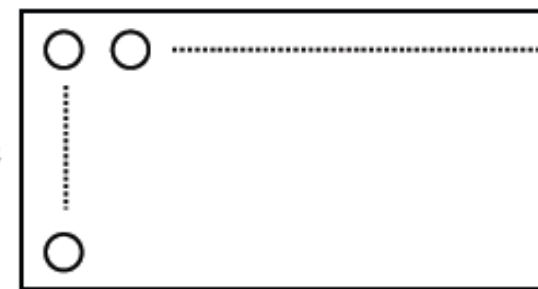
I offer various but appropriate kinds of learning activities (worksheets, hands-on tasks or open discussion) to build up the knowledge.

Example: How to calculate the image file size:

- no. of students in a hall
- no. of uniforms in a hall
- no. of bits in an image file
- no. of MB of a file



In a hall, there are 70 rows and each row has 100 chairs. Calculate the number of students in the hall if all the chairs are occupied.



(3 m)

If each student has 4 different uniforms, calculate the total number of uniforms that the students have.

(3 m)

Use the formula:

Uncompressed image file size (uncompressed) = Image length  $\times$  Image width  $\times$  Colour depth (bits)

Image file size (uncompressed) = Image length  $\times$  Image width  $\times$  Colour depth (bits)

BMP image without compression has the following properties:

Dimensions =  $1024 \times 768$  pixels      Colour depth = 24 bits/pixel

Calculate the file size of the image (in bits) and show your steps.

(3 marks)

| <u>Unit</u> | <u>Abbreviation</u> | <u>Remark</u>   |
|-------------|---------------------|---|
| Bit         | b                   | The basic unit of a binary digit                      |
| Byte        | B                   | 1 B = 8 b   |
| Kilobyte    | KB                  | 1 KB = $2^{10}$ B = 1,024 bytes                       |
| Megabyte    | MB                  | 1 MB = $2^{20}$ B = 1,024 KB (or 1,048,576 bytes)     |
| Gigabyte    | GB                  | 1 GB = $2^{30}$ B = 1,024 MB (about 1 billion bytes)  |
| Terabyte    | TB                  | 1 TB = $2^{40}$ B = 1,024 GB (about 1 trillion bytes) |

Calculate the file size of the image in (a) (in MB) and show your steps.

## Use multiple ways of making meaning

The students are engaged in the learning through discussing what knowledge there is behind a visual or video—it is not just chalk and talk. I create more worksheets for them to consolidate what they have learned from the lesson—at least half of the lesson time is allocated so the students “manipulate” the knowledge.

I create some tasks for the students to work with their computers to apply and consolidate the knowledge being learnt.



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Name: \_\_\_\_\_

Class: F. 4 \_\_\_\_ ( )

### IT Task 03: Graphics Handling

#### ation

are now a web designer. You receive a picture which  
a very large file size and it is very dark. You need to  
e the picture using graphic editing software (e.g. Photo  
ct). Also, you need to change the file format and  
ease the brightness and contrast.



| Problems you've | Problems     | Improvements                 | New features   |
|-----------------|--------------|------------------------------|--|
| Large file      | Too big      | Reduce the file size         | Dimensions of the image are ...<br>Resolution is ...<br>New file size is ... |
|                 | Too dark     | Increase the brightness      |  |
|                 | Too dull     | Increase the contrast        |  |
|                 | Wrong format | Change to the correct format | New file format is ...   |

1: Create a folder called Task03 in ICT folder under your U drive.

Copy Sample1.bmp from S:\ICT

Paste in your Task03 folder.

Record the following data from Sample1.bmp by right-clicking its property.

File size of is \_\_\_\_\_ KB (corr. to nearest integer). The file format is BMP / JPG / GIF. The dimensions

are \_\_\_\_\_ pixels x \_\_\_\_\_ pixels. The resolution is \_\_\_\_\_ ppi.

2: Calculate the colour depth according to the above data.



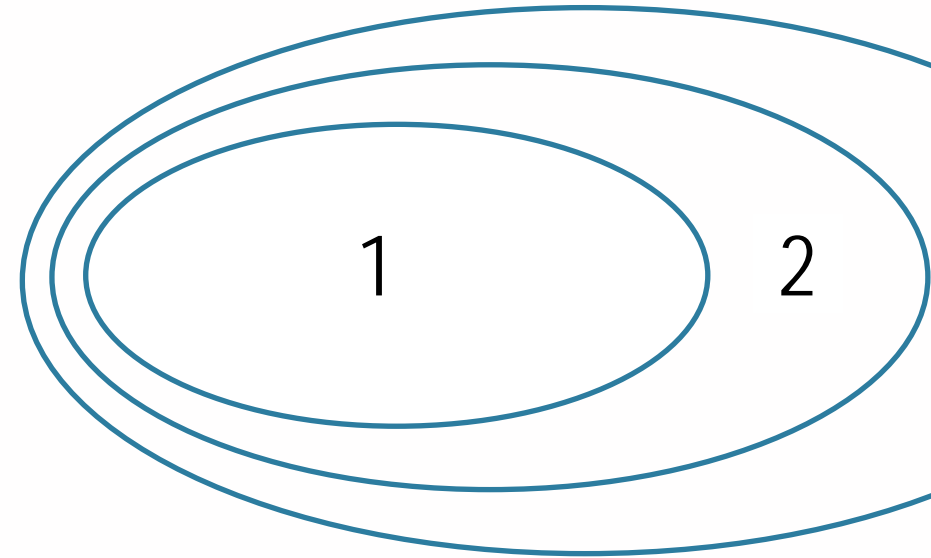
Provide cycles of learning so that the students spiral up to higher levels of knowledge

I facilitate the continuous building up of the knowledge by making sure the students re-apply their prior knowledge in developing the new knowledge.

I make the students active in the classroom not by simply doing things with their hands with concrete things but also “manipulating” abstract concepts on their own.

The class reviews what they have learnt.

Provide cycles of learning so that the students spiral up to higher levels of knowledge



- . The students learn basic computer graphic concepts through my PowerPoint presentations.
- . They work on computer graphic concepts and start to do calculations on their worksheets.
- . They develop further the computer graphic concepts by calculating the image data with the computer, calculating the compression ratio and also practising simple, hands-on image editing skills.

Modify the brightness to “+36” and contrast to “-36”.

Save the file as Sample2.bmp.

Record the following data from Sample2.bmp.

size of Sample2 is ..... KB.

Reason why the file size has or has not changed. ....

Calculate the dimensions (inches) of a hardcopy with a printer of resolution equal to 400 dots per inch.

Change the size of Sample 2 to 1024 x 680 pixels.

Save the file as Sample3.bmp.

What is the file size in KB? Use the byte values to find out. (Corr. to nearest integer).

From the above steps, we know that the picture's dimensions are 1024 x 600 pixels and its colour depth is 24-bit colour. Calculate the file size in KB of the picture.  
Is there any difference between the given size in Step 5 and the calculated one?

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The BMP format is not suitable for webpages. You need to change to JPG format by saving Sample 3 as Sample4.jpg. You could say: "What format should be used for webpages?" Identify the suitable format and save Sample 3 now as Sample 4 and add the appropriate extension. What is the file size in KB?

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Calculate the compression ratio of Sample 4 using the formula for the compression ratio:  $\frac{\text{decrease\_in\_size}}{\text{original\_size}} \times 100\%$ .

## What are the results?

Students are more willing to interact and to discuss with me the content and knowledge behind the pictures or videos during the introduction.

Students are physically and mentally more engaged as they need to do the worksheets or tasks after each short mini-cycle of teaching and learning.

Students think that the lessons are slightly challenging but they are not lost. In fact, they are forever engaged and willing to follow my teaching.

Students know what kind of questions they can ask.

My questions have changed, too, so now I ask questions that the students know they can answer because the questions are asking about knowledge that is "slightly in front" of their current knowledge.