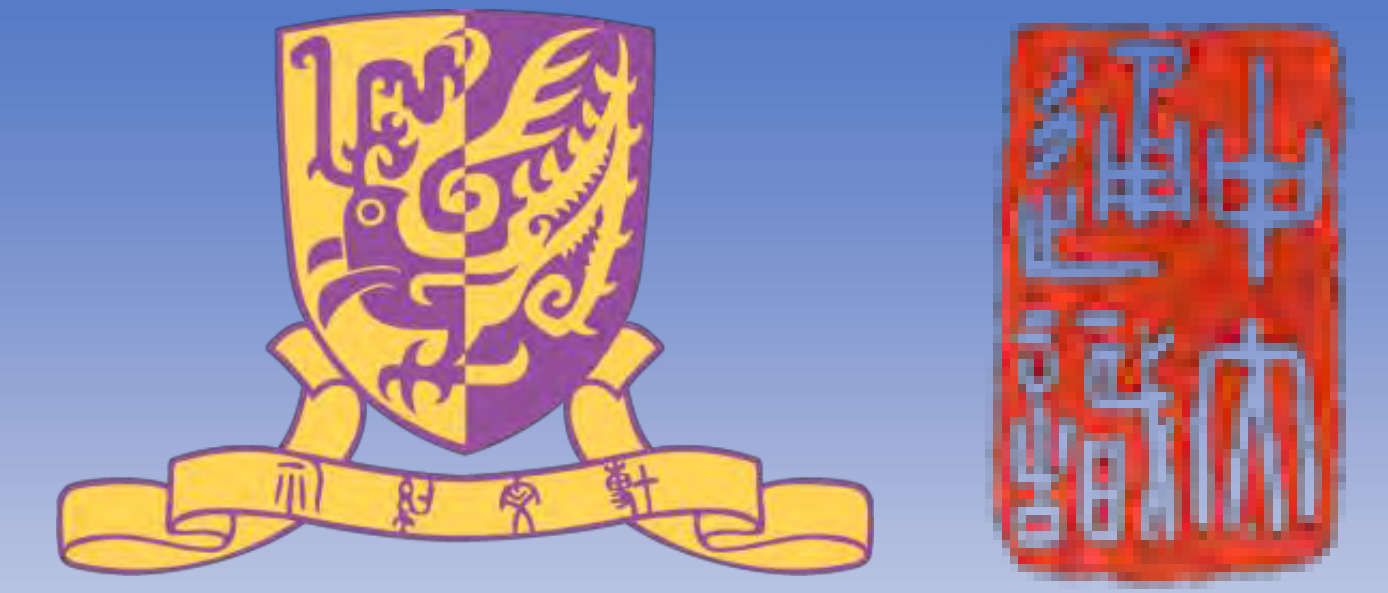


Whiteboard Animation

Flipping UGFN1000 Classroom with Fun

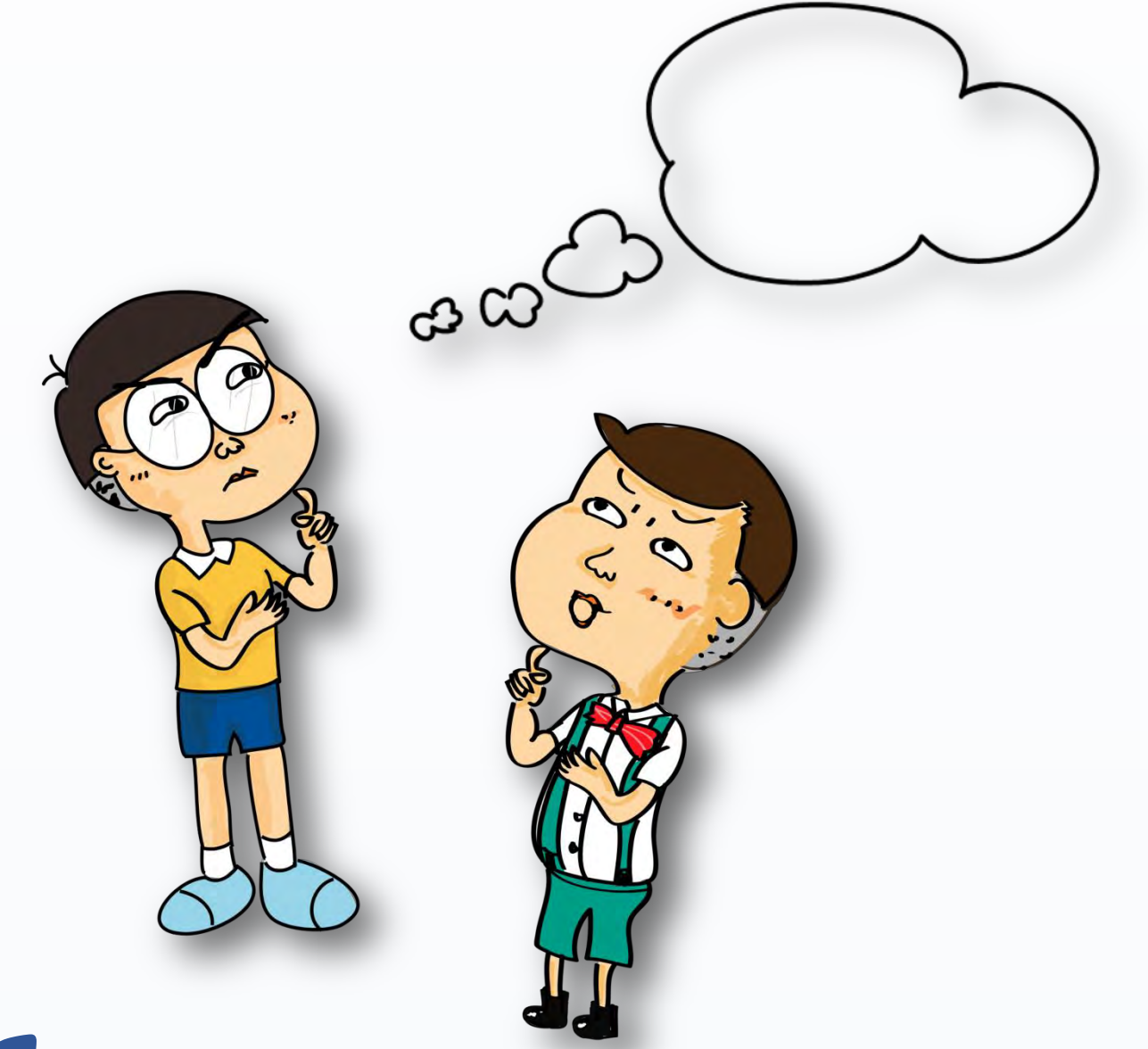
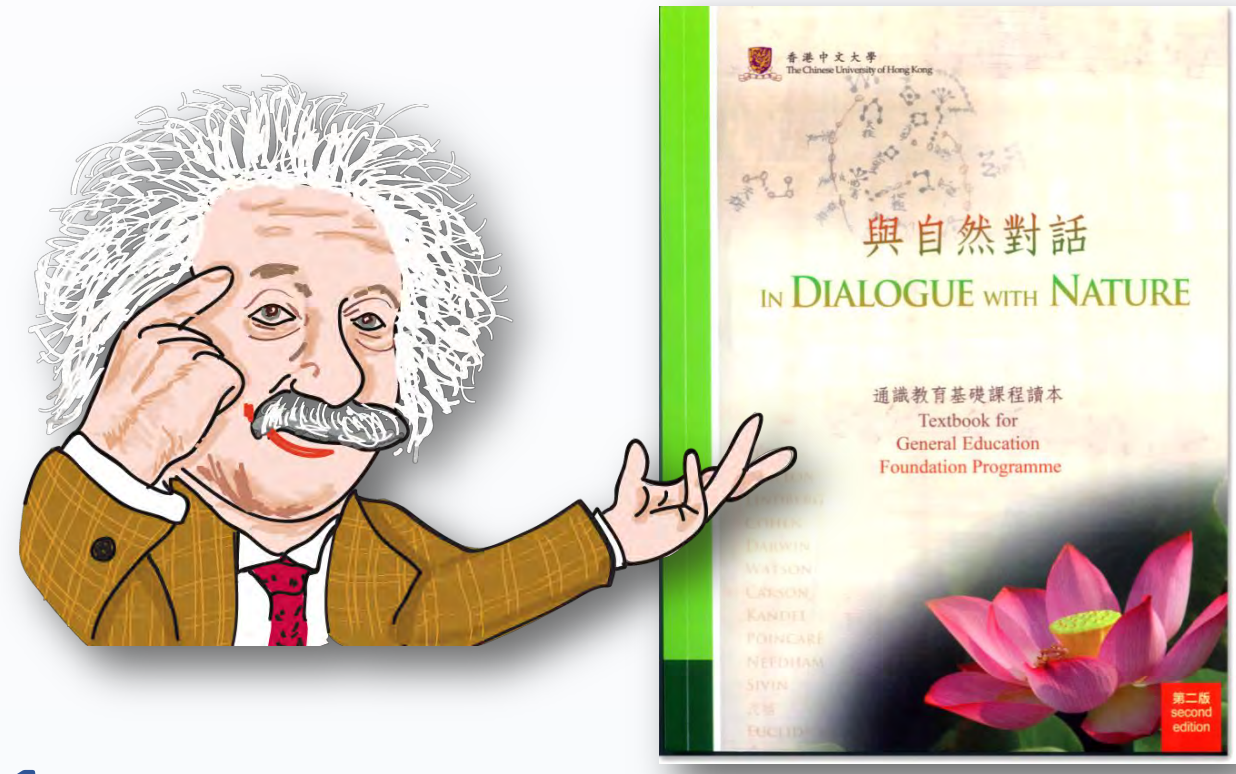


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UGFN1000 In Dialogue with Nature (UGFN)

- Understanding the physical universe and biological world
- Reflecting on scientific knowledge
- Studying science-related classics/core texts

Mode of Teaching and Learning



Lecture

- Teacher introduces the background, author and main ideas of the text in a 45-min lecture

Challenge

- Unable to explain complicated concepts during the lecture time
- Difficult to find teaching materials on specific topics at the appropriate level of difficulty for all the students with diverse disciplinary backgrounds

Text Reading

- Students read the text on their own
- Do not understand the complicated concepts and abstract ideas in the text
- Anxious to study general education science course, especially non-science major students
- Lost interest in reading the difficult text

Tutorial

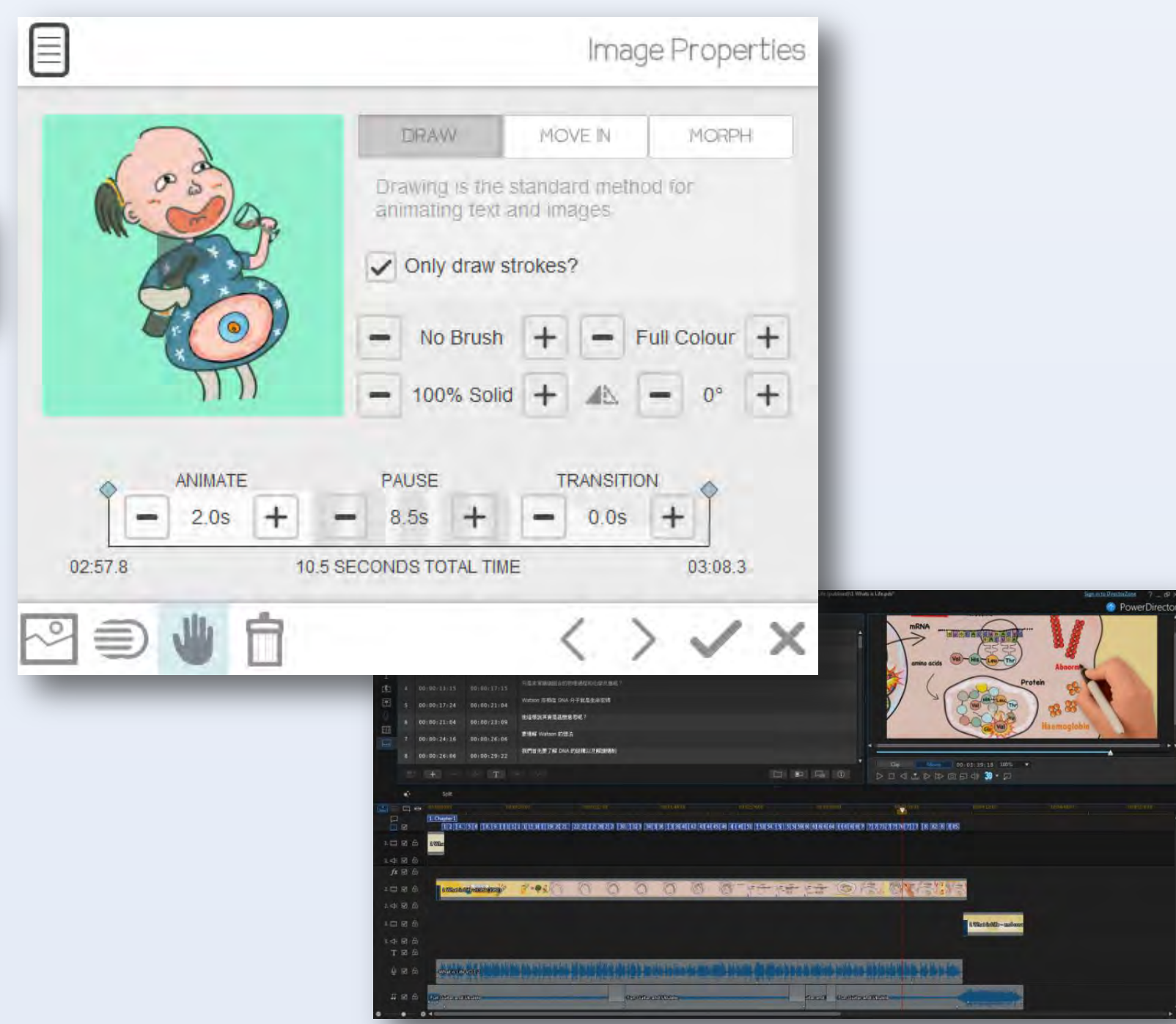
- Teacher guides the students to discuss the text and the extended questions
- Unable to have in-depth discussion due to the lack of pre-requisite knowledge and concepts
- Valuable discussion time is spent on explanation instead of discussion

Whiteboard Animation

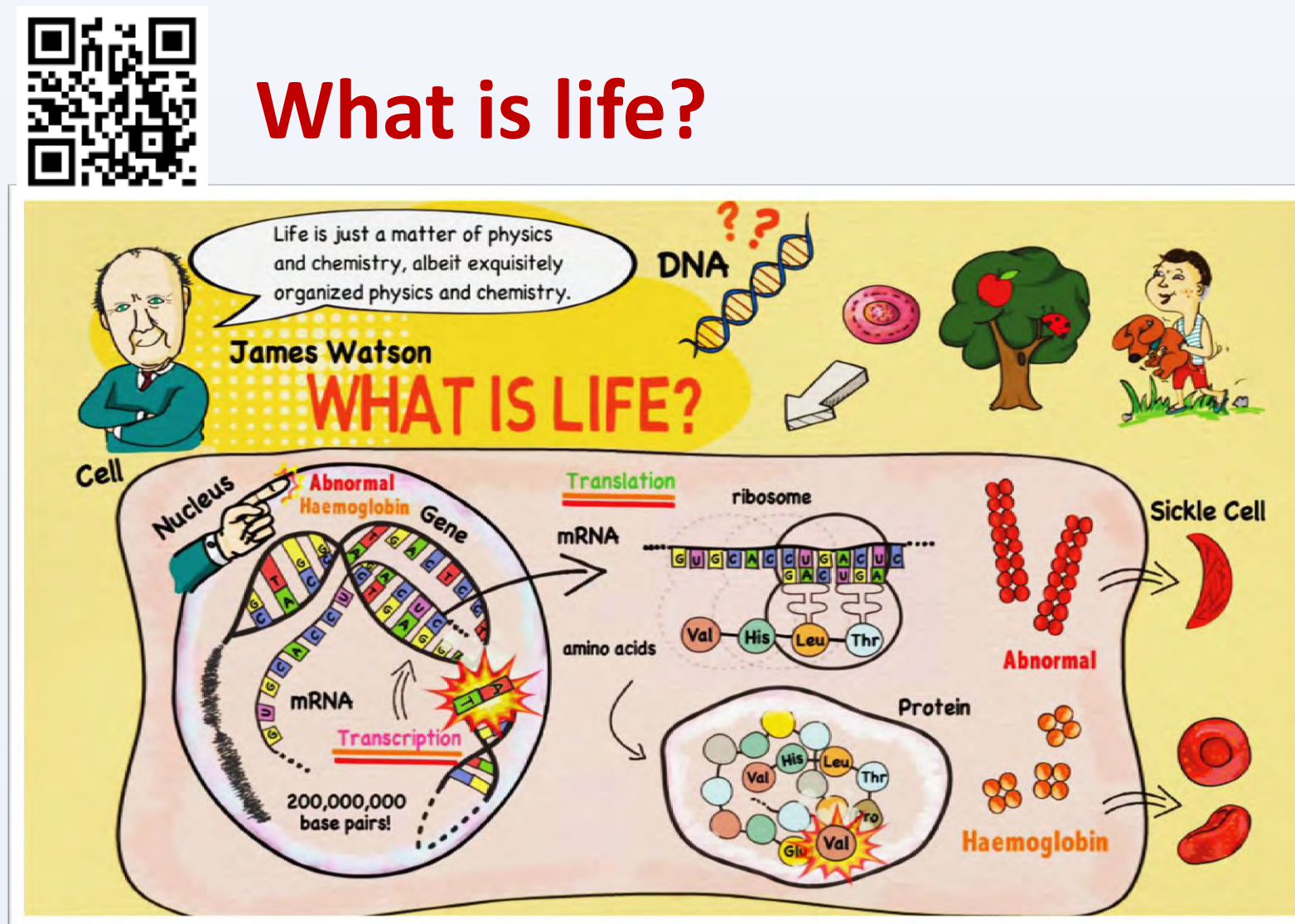
- Student-centered and practical needs driven
- Tailor-made for the needs of specific issues in UGFN
- Bridging the knowledge gap between the text and discussion
- Step-by-step illustrations with voiceover narrations to explain complicated and abstract ideas
- 5-min short animation hosted online for self-paced learning
- Enriching students' learning experience
- Attractive and fun

Production

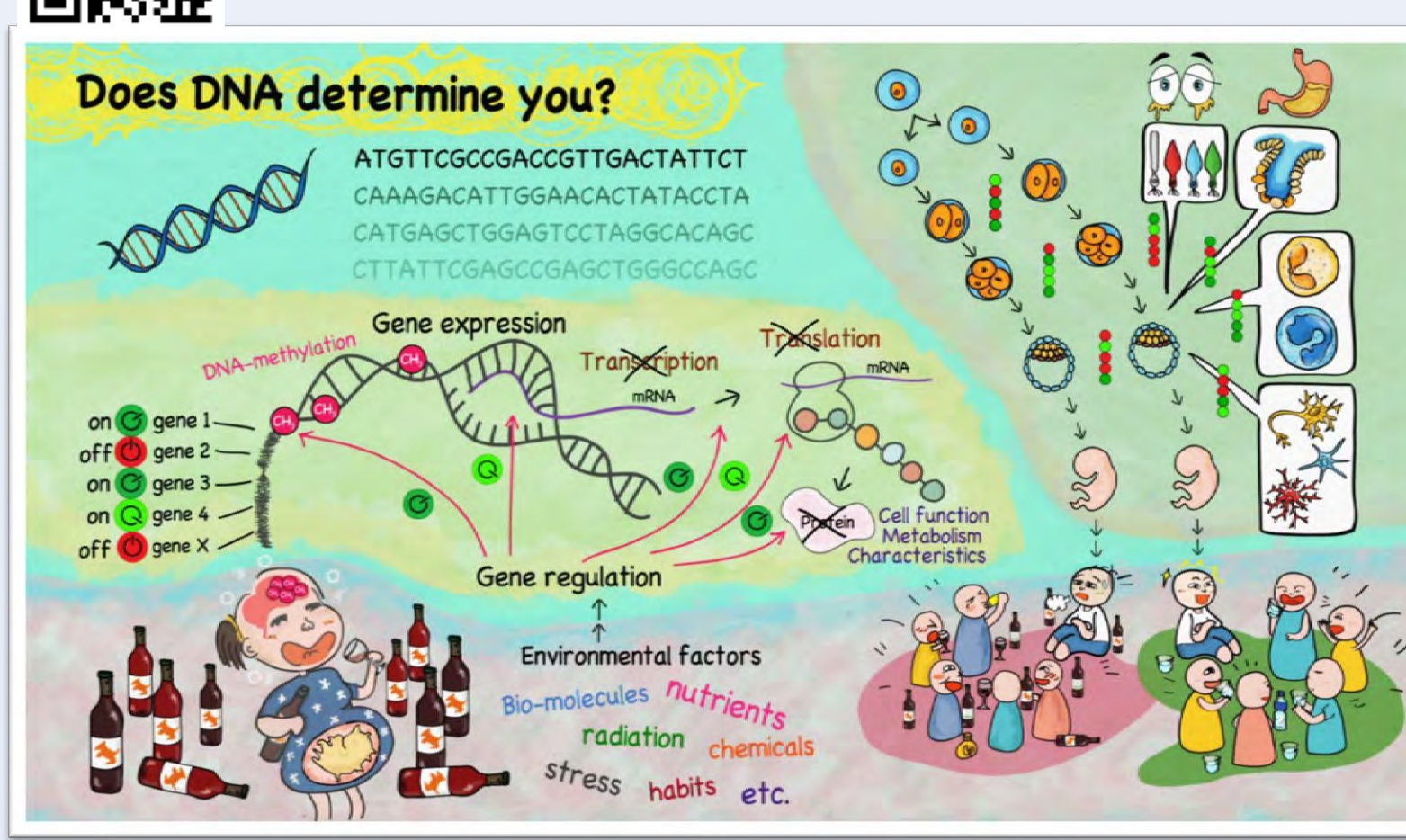
- Storyboard design
- Whole-picture design
- Voice-over production
- Animation production
- Post-production



Micro-module 1: Scientific Enquiry of Life



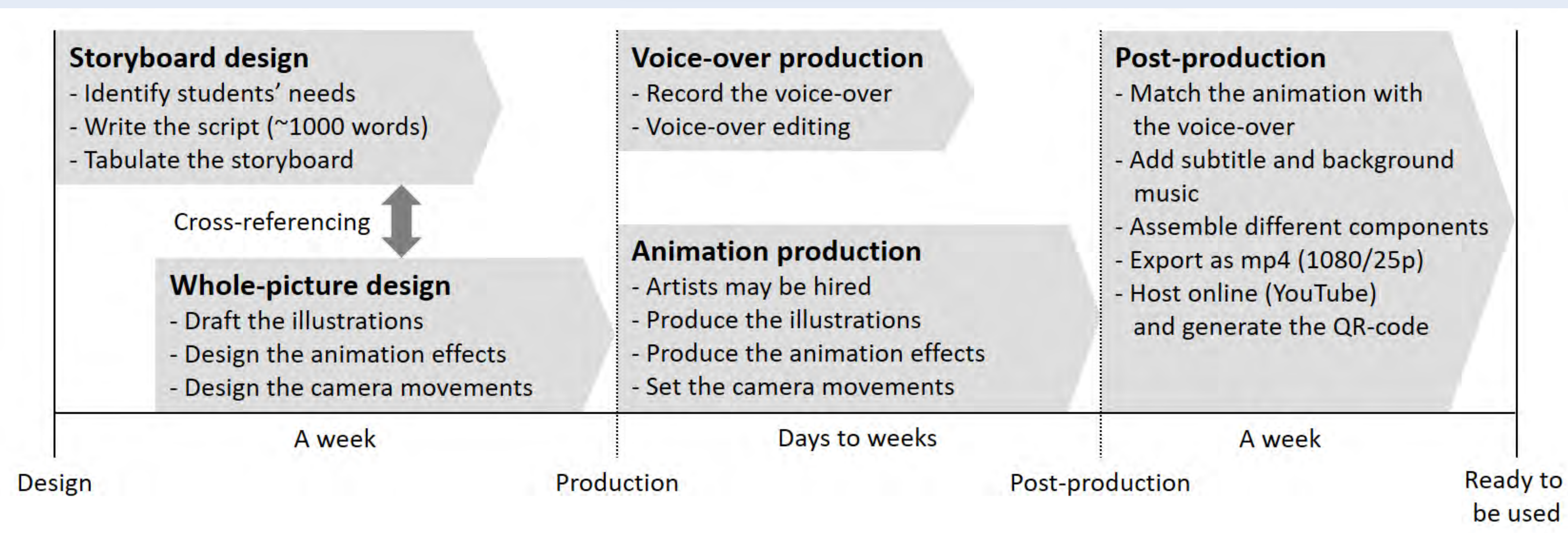
Does DNA determine you?



Micro-module 2: Scientific Enquiry of Mind



Do we have free will?



Scene	Script sentence	Sec.	Animation	Illustration
1-1	What do you think about the saying "DNA determines you?"	5	Write "Does DNA determine you?" (with drawing hand)	-
1-2	DNA is regarded as the code of life	5	Draw DNA structure	
1-3	The biological information is hidden in the DNA sequence. Does it mean that DNA sequence determines you?	7	Write four lines of DNA sequence, colour fades from black to light grey (no drawing hand)	ATGTTCCGCCGACCGTTGACTA CAAAGACATTGGAACACTATA CATGAGCTGGAGTCTTAGCCA CTTATTGCGCCGAGCTGGCC
2-1	Let's look at the following cases	4	Camera move to upper right corner	-
2-2	First, we are all developed from fertilized eggs. The cells divided thereafter have the same DNA sequence. If the hidden biological information is also the same...	10	Draw a cell, an arrow, 2 cells, an arrow, four cells, two arrows, and an embryoblast (no drawing hand)	

The workflow of the production of a whiteboard animation (Li et al. 2017)

A sample of a storyboard (Li et al. 2017)

Assessment

Survey from over 200 students who watched the animations

- These animations are helpful for your understanding of the texts
- These animations are helpful in clarifying the concepts of the discussed issues
- These animations are helpful in gaining the knowledge of life and mind before tutorials
- These animations have raised your interest in the discussed issues
- Whiteboard animation is more interesting than lecture recording
- The level of difficulty of these animations is appropriate
- In general, I am satisfied with these animations

(1 strongly disagree ← → 6 strongly agree)							mean score
1	2	3	4	5	6		
0.6	1.4	7.1	37.4	42.1	11.4	4.53	
0.6	0.9	5.8	35.9	45.7	11.0	4.58	
0.1	0.4	7.5	38.5	45.6	8.0	4.53	
0.5	2.0	10.2	36.0	44.4	7.0	4.43	
0.5	1.1	12.3	37.6	39.9	8.7	4.41	
1.1	1.9	5.6	31.7	48.7	11.0	4.58	
0.6	1.3	3.9	27.2	53.5	13.6	4.73	

(These figures are in percentage)