Resource Package on “The Integrative Use of Generic Skills”
in Junior Secondary Subjects
in Personal, Social and Humanities Education Key Learning Area

Produced by Shiu Ling Po, Fung Man Yuk and Hau Kit Tai

Personal, Social and Humanities Education Section
Curriculum Development Institute
Education Bureau
2017
The Curriculum Development Council (CDC) has identified nine generic skills as essential for student learning for the 21st century in the school curriculum since 2001. For such, two learning packages have been published respectively by the Personal, Social and Humanities Education Section:

- Package on “The Learning and Teaching of Critical Thinking Skills” (Senior Secondary) (2009)

- Package on “The Learning & Teaching of Critical Thinking Skills: Scenario Analysis” (Senior Secondary) (2011)

Based on the past experiences of implementing the curriculum reform, as well as dynamic changes in society and recent research, the nine generic skills are grouped according to their natures in three clusters, namely basic skills, thinking skills, and personal and social skills, for better understanding and integrative application:

<table>
<thead>
<tr>
<th>Basic Skills</th>
<th>Thinking Skills</th>
<th>Personal and Social Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Skills</td>
<td>Critical Thinking Skills</td>
<td>Self-management Skills</td>
</tr>
<tr>
<td>Mathematical Skills¹</td>
<td>Creativity</td>
<td>Self-learning Skills²</td>
</tr>
<tr>
<td>IT Skills</td>
<td>Problem Solving Skills</td>
<td>Collaboration Skills</td>
</tr>
</tbody>
</table>

¹“Numeracy Skills” and ²“Study Skills” were used in *Learning to Learn: The Way Forward in Curriculum: Life-long Learning and Whole-person Development* (CDC, 2001).

Application of individual skills in isolation seems inadequate in meeting the new and complicated challenges. The EDB therefore invited local scholars, Prof Shiu Ling-po and Prof Hau Kit-tai of the Education Psychology Department of The Chinese University of Hong Kong to produce this resource package to show how integrative application of generic skills, ie. Holistic Thinking Skills and Collaborative Problem Solving Skills can be developed through relevant learning activities and themes in the PSHE Key Learning Area.
PROJECT MEMBERS

Project Leaders
SHIU Ling Po (Department of Educational Psychology, The Chinese University of Hong Kong)
HAU Kit Tai (Department of Educational Psychology, The Chinese University of Hong Kong)

Package Authors
SHIU Ling Po (Department of Educational Psychology, The Chinese University of Hong Kong)
FUNG Man Yuk (Department of Educational Psychology, The Chinese University of Hong Kong)
HAU Kit Tai (Department of Educational Psychology, The Chinese University of Hong Kong)

Cover Design & Illustrations
KWAN Hiu Tung
## CONTENTS

<table>
<thead>
<tr>
<th>Chapter One</th>
<th>Integrative Use of Generic Skills</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter Two</td>
<td>Holistic Thinking Skills (I) &lt;7-Step-Approach to Problem Solving&gt;</td>
<td>11</td>
</tr>
<tr>
<td>Chapter Three</td>
<td>Holistic Thinking Skills (I) Cognitive Tools</td>
<td>69</td>
</tr>
<tr>
<td>Chapter Four</td>
<td>Collaborative Problem Solving Skills (I) Collaboration Skills</td>
<td>96</td>
</tr>
<tr>
<td>Chapter Five</td>
<td>Collaborative Problem Solving Skills (II) Values and Attitudes</td>
<td>148</td>
</tr>
<tr>
<td>References</td>
<td></td>
<td>167</td>
</tr>
<tr>
<td>Appendix I</td>
<td>Nine Generic Skills (updated in 2016)</td>
<td>169</td>
</tr>
<tr>
<td>Appendix II</td>
<td>What is Critical Thinking</td>
<td>186</td>
</tr>
<tr>
<td>Appendix III</td>
<td>Models of Cooperative Learning</td>
<td>189</td>
</tr>
<tr>
<td>Appendix IV</td>
<td>Real-life Learning Scenarios</td>
<td>191</td>
</tr>
<tr>
<td>Appendix V</td>
<td>Lesson Plans for PSHE Subjects</td>
<td>204</td>
</tr>
</tbody>
</table>
Chapter 1

*Integrative use of generic skills*

**Chapter focuses**

① What are generic skills
② What does integrative use of generic skills mean
③ Understanding holistic thinking skills
④ Understanding collaborative problem solving skills
⑤ Importance of holistic thinking skills and collaborative problem solving skills
⑥ How to foster the development of holistic thinking skills and collaborative problem solving skills
⑦ How to use this resource package
1.1 What are generic skills?

Generic skills, as one of the interconnected components of the curriculum framework, are the fundamental skills that help students learn to acquire, construct and apply knowledge to solve new problems. In the Learning to Learn curriculum reform in 2001, nine generic skills including communication skills, numeracy skills, IT skills, critical thinking skills, creativity, problem solving skills, self-management skills, study skills and collaboration skills have been identified as essential for student learning in the school curriculum (Table 1.1).

Based on the experience gained in implementing the education reform over the past ten or more years, and dynamic changes in society and recent research, it is proposed that the nine generic skills be grouped into three clusters of related skills for better integrative understanding and application, namely Basic Skills, Thinking Skills, and Personal and Social Skills (refer to Appendix 1 for details). In terms of planning the whole-school curriculum and KLA curricula, schools are advised to provide meaningful contexts for the development of these skills in a holistic manner whereby the grouping/cluster of skills would be suitably and effectively applied and developed through classroom activities and learning experiences.

<table>
<thead>
<tr>
<th>Basic Skills</th>
<th>Thinking Skills</th>
<th>Personal and Social Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Skills</td>
<td>Critical Thinking Skills</td>
<td>Self-management Skills</td>
</tr>
<tr>
<td>Mathematical Skills</td>
<td>Creativity</td>
<td>Self-learning Skills</td>
</tr>
<tr>
<td>IT Skills</td>
<td>Problem Solving Skills</td>
<td>Collaboration Skills</td>
</tr>
</tbody>
</table>

Table 1.1 The nine generic skills in groups
1.2 Integrative use of generic skills

Generic skills are never applied or developed in an isolated manner. For example, to solve a problem, the students will employ creativity to come up with alternative plans. One may need to collaborate with different people in the process of solving a problem. In the future, the demand of creative problem solving and collaborative problem solving will increase. The following diagram shows two examples of integrative use of generic skills.

The Integrative Use of Generic Skills:
Holistic Thinking Skills and Collaborative Problem Solving Skills

Figure 1.1 Integrative use of generic skills
1.3 What are holistic thinking skills?

Holistic thinking skills refer to the integrative use of critical thinking skills, creativity and problem solving skills.

Figure 1.2 Holistic thinking skills

Through different class activities, students can learn to incorporate creativity in the problem solving process. Tackling problems in different contexts will facilitate the development of flexible, innovative and distinct mindset. Critical thinking skills will be deployed for considering the feasibility and effectiveness of various plans and hence identifying the most reasonable and viable solution. To develop holistic thinking skills, students need to apply critical thinking skills, creativity and problem solving skills in a comprehensive manner. The relationship between the three can be represented by a tripod - it will not work with any part missing while the order of the three is interchangeable.

<table>
<thead>
<tr>
<th>Basic skills</th>
<th>Thinking skills</th>
<th>Personal and Social skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Skills</td>
<td>Critical Thinking Skills</td>
<td>Self-management Skills</td>
</tr>
<tr>
<td>Mathematical Skills</td>
<td>Creativity</td>
<td>Self-learning Skills</td>
</tr>
<tr>
<td>IT Skills</td>
<td>Problem Solving Skills</td>
<td>Collaboration Skills</td>
</tr>
</tbody>
</table>

Table 1.2 Holistic thinking skills
1.4 What are collaborative problem solving skills?

- Collaborative problem solving skills refer to the integrative use of communication skills, problem solving skills and collaboration skills.
- The teacher can group students into learning, problem solving or creativity teams, to let them interact and cooperate with each other through discussing problems they face in daily lives. Collaborative problem solving skills can also be developed through learning activities in different subjects.
- Collaborative problem solving skills constituted one of the evaluation domains of PISA\(^1\) 2015.

### Collaborative Problem Solving Skills

<table>
<thead>
<tr>
<th>Basic Skills</th>
<th>Thinking Skills</th>
<th>Personal and social skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Skills</td>
<td>Critical Thinking Skills</td>
<td>Self-management Skills</td>
</tr>
<tr>
<td>Mathematical Skills</td>
<td>Creativity</td>
<td>Self-learning Skills</td>
</tr>
<tr>
<td>IT Skills</td>
<td>Problem Solving Skills</td>
<td>Collaboration Skills</td>
</tr>
</tbody>
</table>

Table 1.3 Collaborative problem solving skills

---

\(^1\) Programme for International Student Assessment, abbreviated as PISA, is a project designed by the Organization for Economic Co-operation and Development (OECD) to assess how well 15-year-old students who have nearly completed basic education are equipped with the knowledge and skills essential for meeting the challenges in society.
1.5 The importance of holistic thinking skills and collaborative problem solving skills

- Traditional teaching models focus on unidirectional knowledge transfer. In these models, students are rarely trained to think holistically or solve problems collaboratively. The dominant thinking modes in these models are linear and there is a lack of innovation.

- Education in the 21st century emphasizes the fostering of students' abilities to analyze problems. That includes thinking from multiple perspectives, tackling problems holistically, and proposing solutions that can cover the interests of different stakeholders.

- The working environments in the future will require people to cooperate and solve problems together. Collaboration can take place among team members from different classes, languages, geolocations and cultures.

- Students need to develop positive values and attitudes to become responsible team players who respect partners and commit themselves in the tasks.
1. Knowledge: It is important for teachers to constantly keep abreast of the changing world and their knowledge up to date. Teachers’ interdisciplinary knowledge needs ongoing strengthening.

2. Quality: Teachers need to be open-minded towards different ideas. They also need to appreciate students’ creativity.

3. Mentality: It is not necessary for teachers to burden themselves with the thought that they must be more knowledgeable or capable than their students in all aspects. Instead, teachers can explore and learn with the students and become their facilitators throughout the learning journey.

4. Roles: Teachers play diversified roles throughout the learning process, depending on students’ ability and learning progress. Sometimes, teachers are the mentors or coaches. Other times, they are the learning partners who experience attempts and failures with the students. Or, teachers can be strict adjudicators who are always trying to push students for improvement.

5. Inspire students with knowledge: Putting emphasis on the development of students' capabilities, strategies and attitudes, which include:

   a. Inspiring students to develop thinking skills.
   b. Developing students' self-learning abilities, including setting learning / problem solving goals; monitoring their own learning / problem solving processes; applying learning strategies; self-monitoring etc.
   c. Fostering students' interests and abilities in problems solving.
   d. Encouraging students to apply their knowledge and skills in daily lives.
   e. Encouraging students to develop creativity, thinking from multiple perspectives
and connecting imagination with life experiences.

f. Cultivating students' ability in collaborating with people of different backgrounds.

6. Teaching strategies:

a. Student-centered approach: Teachers can support student learning by offering scaffolds. For example, teachers can provide systematic guidance to students.

b. Offer tasks with detailed consideration of the depth of knowledge, the complexity of the case and the difficulties of the strategies, etc.

c. Encourage students to discuss issues from multiple perspectives, and provide them with appropriate feedback and support.

d. Depending on the circumstances, teachers can deliberately set up contradictory scenarios to create tension, so as to stimulate students’ curiosity and motivation for exploration.

e. Teachers can actively introduce problems that need the kicking-in of creativity. Problem solving groups can then be set up for students to work together, such that students’ collaborative problem solving abilities can be enhanced.

f. Assessment and evaluation: Emphasis should be placed on formative assessment. Teachers can provide feedback throughout students’ creative and collaborative problem solving processes. The evaluation of generic skills does not solely depend on pen and paper. It also relies on the observation and professional judgement of teachers.

---

1. Actively participate in the learning process.
2. Employ logical thinking as a habit of mind and unleash imagination.
3. Apply the knowledge and skills learnt in class to everyday life.
4. Be creative and innovative.
5. Become a responsible and good team player who works well with others.
6. Strive for progress, even though it may just be a small step forward. Do not feel discouraged.
Home-school collaboration can foster the development of generic skills of students. Teachers can advise parents to:

1. Allow children to think independently and solve problems on their own. Listen carefully to their ideas without premature judgement and provide help or guidance where appropriate.

2. Encourage children to think creatively, and give them appropriate feedback.

3. Be a role model to your children: Have the courage to make new attempts and solve problems, and be willing to work with others.
1.7 How to use this resource package?

- There is a “Chapter focuses” at the beginning of each chapter. Real-life Learning Scenarios and Personal, Social & Humanities Education (PSHE) case studies are also provided in this learning package.
  - Real-life Learning Scenarios consist of problems encountered in daily lives. They are designed for the engagement of students with diverse background knowledge.
  - Application examples in different PSHE subjects can be found in the appendix. Teachers can choose the materials and make adaptive use in accordance with the needs of the students. Students are expected to apply the problem solving strategies learned in the Real-life Learning Scenarios to tackle problems in different PSHE subjects.

- Each chapter is divided into different sub-topics. Teachers are advised to select appropriate content to cater for students’ learning needs.

- The resource package comes with suggested answers and rubrics. Diversified assessment system is designed to assess students’ generic skills. Constructive feedback and assistance will also be provided. The assessment system includes:
  - Formative and summative assessment
  - Self-evaluation, peer evaluation and teacher evaluation
Chapter 2
Holistic thinking skills (1)

<7-step-approach to

problem solving>

Chapter focuses: Students will learn
① how to apply the <7-step-approach to problem solving>
② the correct attitude and value towards problem solving
③ to incorporate critical thinking skills into the problem solving process
④ to be creative during problem solving process
Suggested teaching activity combinations:

Planning on the basis of double lessons of 80-minute

<table>
<thead>
<tr>
<th>Combination (to be selected according to student needs)</th>
<th>Content</th>
<th>Time</th>
<th>Related teaching materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to holistic thinking skills</td>
<td>10 min</td>
<td>P. 3–4 ; 13</td>
</tr>
<tr>
<td></td>
<td>How to apply the &lt;7-step-approach to problem solving&gt;</td>
<td>40 min</td>
<td>P. 14–29</td>
</tr>
<tr>
<td></td>
<td>Incorporating critical thinking into the problem solving process</td>
<td>20 min</td>
<td>P.35 ; Appendix II</td>
</tr>
<tr>
<td></td>
<td>Being creative during problem solving process</td>
<td>10 min</td>
<td>P. 43–44</td>
</tr>
<tr>
<td>2</td>
<td>Introduction to holistic thinking skills</td>
<td>10 min</td>
<td>P. 3–4 ; 13</td>
</tr>
<tr>
<td></td>
<td>How to apply the &lt;7-step-approach to problem solving&gt;</td>
<td>40 min</td>
<td>P. 14–29</td>
</tr>
<tr>
<td></td>
<td>From &lt;7-step-approach to problem solving&gt; to PSHE</td>
<td>30 min</td>
<td>P. 36–41</td>
</tr>
<tr>
<td>3</td>
<td>How to develop creativity?</td>
<td>40 min</td>
<td>P. 43–56</td>
</tr>
<tr>
<td></td>
<td>Application in daily life situations</td>
<td>40 min</td>
<td>P. 59–65</td>
</tr>
<tr>
<td>4</td>
<td>Application in daily life situations</td>
<td>40 min</td>
<td>P. 59–65</td>
</tr>
<tr>
<td></td>
<td>PSHE case studies</td>
<td>40 min</td>
<td>P. 66–68 ; Appendix V</td>
</tr>
</tbody>
</table>
Holistic thinking skills refer to the integrative use of critical thinking skills, creativity and problem solving skills.

![Diagram showing Holistic thinking skills](image)

**Figure 2.1 Holistic thinking skills**

The principal axis of holistic thinking is problem solving. In the context of solving problems, critical thinking is not merely criticising another person’s opinion or making empty statements. Instead, critical thinking means scrutinizing an opinion by evaluating its accuracy, source reliability and examining the thinking of ourselves as well as those of others. For example, have we gathered sufficient information to define a problem? What are the core issues of the problem? Similarly, with problem solving as the center, creativity is no longer free-floating imagination, but a goal-directed activity aiming at finding innovative solutions to problems.

When faced with problems, we often rush to the conclusion impulsively, giving too little consideration to some decisive focal points. As a result, it is often the case that some impulsive conclusions turn out to be impractical or cause more harm than good when we try to implement them.

In the following sections, we are going to explore how to apply problem solving skills, critical thinking skills and creativity integratively, as well as how to develop holistic thinking skills in the problem solving process.

Let’s start with problem solving.
What is problem solving?

When we were children we heard about stories of Si Ma Guang (司馬光) smashing a big jar to save his friend and Wen Yan Bo (文彥博) pouring water into a tree hole to retrieve a ball dropped inside the hole. These stories seem to suggest that only smart people can solve problems. Smart people can instantly come up with innovative and creative ideas to solve problems and save the day. On the other hand, ordinary people can only stand aside observing, wishing they could have done the same.

Are flashes of inspiration really magical? In his best-selling book Thinking Fast and Slow (2011), Daniel Kahneman, a 2002 laureate of Nobel Memorial Prize in Economics, stated that thinking processes can be divided into two systems. System 1 is fast, intuitive and emotional, while system 2 is slower, more deliberate and logical. According to Kahneman’s research, although system 1 thinking is more touted by the public, it is less reliable. On the contrary, system 2 thinking can be trained and improved. With practice, anyone can develop a powerful system 2 thinking ability. Kahneman also earnestly advised us to resist the temptation of fast, intuitive thinking, and rely more on system 2 thinking.

From time to time, we encounter different challenges in life. There is no need for us to look for problems to train ourselves because problems come to us inevitably. One day, my cellular phone was not working properly. The first thought that came to my mind was to send it to repair or buy a new phone. However, when I calmed down a bit and thought about it, I wondered if those solutions really solved my problem. Sending a cellular phone for repair would take days or even weeks. Could I live without a phone for so long? Even if I could afford buying a new phone, could all the contact information, photos and music from my old phone be transferred to the new phone? Shouldn’t I try to repair the phone rather than creating another piece of electronic waste? Let us look at the following example, and see how we can solve a cellular phone problem logically with system 2 thinking.

2.1 <7-step-approach to problem solving>
Teacher: One morning when I woke up and checked on my cell phone, I found out there's only 3% battery left although it had been charged overnight. I took a closer look at the screen only to see that the charging signal was not on. What happened? I looked around, the lights were all on, which meant the electricity was working fine. I changed another power plug, my phone was still not charging. Probably some components of my phone were not working? Which parts could that be?

<Ask students>

<Student may answer: (1) the charger was broken; (2) the phone battery was broken>

<Teacher can list the possible causes suggested by the students on the blackboard, followed by asking them how to determine which one is the real cause of the problem.>

Teacher: I also suspected that the charger was not working properly. Since I had another charger of the same model, I gave it a try. Unfortunately, my cell phone was still not charging after I changed the charger. <Ask student> What should I do then?

<Students may answer: perhaps the battery is broken. Teacher should encourage students to suggest more possible causes.>
Teacher: I thought the phone battery might be broken too. However, I did not have a spare battery at home, so I decided to buy a new one from Apliu Street (a local electronic gadget market). When I arrived at Apliu Street, I was able to find the battery I wanted very quickly. But the salesperson also recommended me to buy a universal external battery charger, in addition to the battery. <Ask students> Should I buy it?

<Students comment>

Teacher: Hearing the suggestion from the salesperson, I suddenly realized that I had missed out a plausible cause of my charging problem. <Ask students> Do you know what it is?

<Students comment>

Teacher: Worrying that the plausible cause might be true, I would rather not waste time and money going back to Apliu Street again, so I bought the external charger as well. When I got home, I replaced my old battery with the new one, but the phone was still not charging. So I put the battery inside the external charger. This time, the battery could be charged. Then I put the battery back into the cell phone for use after it had been fully charged. <Ask student> Now can you figure out which part of my phone was broken?

Teacher: Class, we have just gone through a problem solving process. Let us recap, and see if we can sort out the important steps of the process. <Distribute worksheet>

<Afterword>
A few months later, my brother came to my apartment with a white fast-charging power adapter. I tried it on my cell phone. The USB plug of that adapter was a bit large, so I had to push it in with a little force. Guess what happened? BINGO, my phone could be charged! At that moment, I finally figured out that the real cause of the charging problem was…<Ask students to answer>

**Challenging questions**

- Can you suggest some improvements to the problem solving process?
- In the case study, “I” had not really found out the real cause of the charging problem, yet “I” still managed to solve the problem. Do you think we need to find out the actual cause of a problem in order to have it solved fundamentally?
Worksheet

Figure 2.2  "7-step-approach to problem solving"

Step 1: Identify/define the problem

The cell phone cannot be charged.

Step 2: Analyse possible causes

<table>
<thead>
<tr>
<th>Cause</th>
<th>Method to verify the hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Problem with the charging cable</td>
<td></td>
</tr>
<tr>
<td>2. Problem with the phone battery</td>
<td></td>
</tr>
<tr>
<td>3. Problem with the cell phone</td>
<td></td>
</tr>
<tr>
<td>4. Problem with the charging port</td>
<td></td>
</tr>
</tbody>
</table>
### Step 3: Develop alternative solutions

<table>
<thead>
<tr>
<th>Assuming the following item is the real cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Problem with the charging cable</td>
<td>(Replace the charging cable)</td>
</tr>
<tr>
<td>2. Problem with the phone battery</td>
<td>(Replace the battery)</td>
</tr>
<tr>
<td>3. Problem with the cell phone</td>
<td>(Send the cell phone for repair)</td>
</tr>
<tr>
<td>4. Problem with the charging port</td>
<td>(Insert the USB plug firmly to the receptacle when charging the phone) (Buy an external battery charger)</td>
</tr>
</tbody>
</table>

### Step 4: Evaluate each solution

<table>
<thead>
<tr>
<th>Possible solution</th>
<th>Cost effectiveness</th>
<th>Risk analysis</th>
<th>Moral consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Try to insert the USB plug firmly into the receptacle when charging the phone</td>
<td>Easy to handle, very low cost, but hard to ensure effectiveness</td>
<td>Low</td>
<td>No moral concerns</td>
</tr>
<tr>
<td>2. Try to replace the cable</td>
<td>Easy to handle, low cost, but hard to ensure effectiveness</td>
<td>Low</td>
<td>No moral concerns</td>
</tr>
<tr>
<td>3. Try to replace the battery</td>
<td>Easy to handle, reasonable cost, but hard to ensure effectiveness</td>
<td>May waste money on buying a new battery</td>
<td>No moral concerns</td>
</tr>
<tr>
<td>4. Take the whole cell phone set to a local repair shop</td>
<td>Less cost than authorized repair centre, but the quality of service not guaranteed; unable to use the phone during the repair period</td>
<td>High risk of data leakage</td>
<td>Everyone is responsible for protecting his/her personal information, including their own images, and others’ pictures in</td>
</tr>
<tr>
<td>Step 5: Select the best solution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Prioritize the solutions after weighing their pros and cons, and then choose the best one.

<table>
<thead>
<tr>
<th>Prioritize the solutions after weighing their pros and cons</th>
<th>Cost effectiveness</th>
<th>Risk analysis</th>
<th>Moral consideration</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Try to insert the USB plug firmly into the receptacle when charging the phone</td>
<td>Easy to handle, very low cost, unsure about effectiveness</td>
<td>Low</td>
<td>No moral concerns</td>
<td></td>
</tr>
<tr>
<td>2. Try to replace the cable</td>
<td>Easy to handle, low cost, unsure about effectiveness</td>
<td>Low</td>
<td>No moral concerns</td>
<td></td>
</tr>
<tr>
<td>3. Try to replace the battery</td>
<td>Easy to handle, reasonable cost,</td>
<td>May waste money on</td>
<td>No moral concerns</td>
<td></td>
</tr>
<tr>
<td></td>
<td>but unsure about effectiveness</td>
<td>buying a new battery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------</td>
<td>----------------------</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>4. Take the whole cell phone set to a local repair shop</td>
<td>Less cost than authorized repair centre, but the quality of service not guaranteed; unable to use the phone during the repair period</td>
<td>High risk of data leakage</td>
<td>Everyone is responsible for protecting his/her personal information, including their own images, and others’ pictures in the phone.</td>
<td></td>
</tr>
<tr>
<td>5. Take the whole cell phone set to an authorized repair centre</td>
<td>Low cost within the warranty period, high cost after the warranty period. Unable to use phone during the repair period.</td>
<td>Some risk of data leakage, but less than an unauthorized service provider.</td>
<td>Although the risk is not high, one should still take action to protect his/her personal information in the phone.</td>
<td></td>
</tr>
<tr>
<td>6. Buy a second-hand high-end phone</td>
<td>High cost, high return</td>
<td>Cost higher than brand new phone</td>
<td>Antedating an electronic waste, causing pollution</td>
<td></td>
</tr>
<tr>
<td>7. Buy a brand new mid-range phone</td>
<td>High cost, fair return</td>
<td>Cost lower than second-hand phone</td>
<td>Antedating an electronic waste, causing pollution</td>
<td></td>
</tr>
</tbody>
</table>

**Best solution at present:**

Solution plan 1: Try to insert the USB plug firmly into the receptacle when charging the phone.
**Step 6 : Implement the solution**

Discussion:

- Do you think we should only try one solution at a time, or several solutions at the same time? Eg. Replace the cable and battery, while making sure that the plug is firmly inserted at the same time. Discuss the pros and cons.

- Teacher may remind students that there may be more than one solution for some problems, so students have to be flexible and adaptive in different circumstances.

**Step 7 : Evaluate and reflect**

Follow-up on solution:

1. If solution (1) works, it means that we have to make sure the USB plug is firmly inserted to its receptacle everytime we charge the phone. Can this method solve the problem once and for all?

2. If the solution does not work, we should try another method.
Self-evaluation

Sample questions for reflection:

1. Have I considered all the possible reasons why the cell phone cannot be charged?
2. Have I evaluated the solutions from a long-term perspective? (E.g., The phone has been used for many years. It is likely that many components are going to be worn out. Getting a new phone may be a better solution in the long run.)
3. Have I carefully considered and evaluated the cost and benefit of each solution, including anticipating any new problems that may arise?
4. Do I have solutions for the new problems that may arise?
5. Do I have any back-up plans?

Positive values and attitudes towards problem solving

✧ Do not give up easily when confronted with obstacles. Always actively look for solutions. For example, do not rush into buying a new cell phone before you figure out why it fails to be charged.

✧ Allow ambiguities and uncertainties in the problem solving process. For example, when you try to find out why the phone cannot be charged, also look into reasons that appear to be “seemingly impossible”.

✧ Accept the fact that everyone makes mistakes. Learn from your mistakes. For example, you should not blame yourself for spending time and money on finding out why the phone cannot be charged.

✧ Be open-minded towards different views and perspectives. Listen to different opinions. For example, you should not blindly believe that the quality of products from certain brands must be guaranteed. Gather opinions from different users, reflect on your own experiences, and then make your own judgement on which brand you should choose.
Lesson plan

Title: <7-step-approach to problem solving>
Level: F.1 - F.3
Time: 40 mins

Learning objectives

Knowledge (K):
1. Learn about the strategy of <7-step-approach to problem solving>. The main focuses include:
   a. Try to identify the causes when there is a problem.
   b. Look for solution(s) for each cause.
   c. Know how to evaluate the solutions and choose the best option.
   d. Reflect upon the whole process after carrying out the solution
2. Understand that there is more than one problem solving strategy, so students have to be flexible and adaptive in different circumstances.

Skill (S):
1. Able to solve daily life problems with the strategy of <7-step-approach to problem solving>.

Attitude (A):
2. Allow ambiguities and uncertainties during the problem solving process.
3. Accept the fact that everyone makes mistakes and should learn lessons from them.
4. Be open-minded towards different views and perspectives, and be receptive to different opinions.
## Teaching procedure

<table>
<thead>
<tr>
<th>Session</th>
<th>Time</th>
<th>Teaching activity</th>
<th>Learning objective</th>
<th>Related information</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 mins</td>
<td>(Whole class) Teacher provides background information for the case study of “Cell phone cannot be charged?”</td>
<td>K1, A1, A2</td>
<td>Image of a cell phone that is not charging</td>
<td>Students may instantly come up with causes or solutions, such as “take it to a repair shop” or “buy a new one”. Teacher should guide students to solve the problem step by step.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Teacher may ask the following questions:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>♦ Do you have similar experiences?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>♦ What would you do if your phone was not charging?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>20 mins</td>
<td>Teacher explains the &lt;7-step-approach to problem solving&gt;, and apply it step-by-step to the example of “Cell phone cannot be charged”.</td>
<td>K1, K2, S1, A1, A2, A3, A4</td>
<td>Worksheet (1)</td>
<td>&lt;7-step-approach to problem solving&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. (Whole class) Teacher points out that whenever we encounter a problem, the first</td>
<td></td>
<td></td>
<td>&lt;1&lt;sup&gt;st&lt;/sup&gt; step: Identify / define the problem&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>step is to identify the problem.</td>
<td></td>
<td></td>
<td>&lt;2&lt;sup&gt;nd&lt;/sup&gt; step: Analyze possible causes&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;3&lt;sup&gt;rd&lt;/sup&gt; step: Develop alternative solutions&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;4&lt;sup&gt;th&lt;/sup&gt; step: Evaluate each solution&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;5&lt;sup&gt;th&lt;/sup&gt; step: Select the best solution&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;6&lt;sup&gt;th&lt;/sup&gt; step: Implement the solution&gt;</td>
</tr>
</tbody>
</table>
step is always to define the problem, and then look for different possible causes of the problem. Students should be reminded to consider different possibilities.

2. (Group) Divide students into groups of four to discuss possible causes of why the phone cannot be charged.

3. (Whole class) Teacher uses tables to summarize different possible causes suggested by students, and then guides them to evaluate the possibility of each cause, and sort out several causes for further discussion.

4. (Group) Teacher divides students into groups of four to discuss how to find out the real cause of the problem.

Or

(Group) Teacher divides

<7th step: Evaluate and reflect>

- When students are discussing the possible causes of the problem, be aware if they have missed any important possibilities. Praise students if they come up with causes that are usually overlooked.

- Teacher should provide clear guidance during group discussions. (e.g. Use “Students, I want you to form groups of four with classmates around you. Each group should get a sheet of paper and write down the possible causes of why the phone cannot be charged. I will invite students to share their ideas after 5 minutes.” instead of “Students, I want you to divide into groups of four and discuss why the phone cannot be charged”.)
students into groups of four. Each group is responsible for generating solutions for one of the causes.

5. (Whole class) Teacher writes down the solutions outlined by the students in a table, and discusses with students the pros and cons of each solution.

6. (Whole class) Students vote to choose the best solution based on the pros and cons.

7. (Whole class) Teacher may ask students if they can only try one solution at a time, or several solutions at the same time? (e.g. Replacing the cable and battery, while making sure that the plug is firmly inserted at the same time.) Discuss the pros and cons with students.

8. (Whole class) Teacher advises students to evaluate
and reflect on the whole process after implementing the solution.

9. (Whole class) Teacher reminds students that there are more than one problem solving strategies. Students have to be flexible and adaptive in different circumstances.

Teacher may ask the following questions:
- Why should we learn problem solving?
- What are the advantages of dividing the problem solving process into several steps?
- What may be the causes behind a phone that cannot be charged?
- Do you usually reflect on the process after solving problems?
- How can we practise reflection effectively? (Examine the
effectiveness of the result / the time and money required; compare with solutions suggested by others)

- Do you think we can only try one solution at a time? Or several solutions at the same time? What are the pros and cons?
- Do you think the <7-step-approach to problem solving> is the only problem solving model?

| 3 | 10 mins | （Whole class）Attitude towards challenging problems:
1. Students write down their attitudes towards challenging problems on a worksheet, and the correct attitude they should have.
2. Teacher teaches students the correct value and attitude they should uphold when they solve problems. | A1, A2, A3, A4 | Worksheet（1） | Teacher can guide students to examine their own problem solving habits. |
Teacher can ask the following questions:
✧ Do you enjoy solving problems?
  Do you feel satisfied after solving problems?
✧ How do you react to obstacles?
✧ What do you think is the correct attitude for problem solving?
✧ Based on the 4 correct problem solving attitudes suggested, how many of them do you think you usually fulfil?

| 4 | 5 mins | (Whole class) Summarize and recap on the 7-step-approach to problem solving | K1、S1 | / | / |
The <7-step-approach to problem solving> combines ideas from a number of fields of study, which include: Bransford & Stein (1984) from psychology and education; and Wanatabe (2009) from business school. However, the original models proposed by them focused more on solving problems than on learning from the problem solving experience. Because we believe that it is important for students to learn from their problem solving experiences, we include “Evaluate and reflect” as the 7th step in our problem solving model. PISA (2010, 2015) divides the problem solving processes into four sub-processes: (1) Explore and understand; (2) Represent and formulate (hypotheses); (3) Plan and execute; (4) Monitor and reflect. The conceptualization of PISA aligns with the <7-step-approach to problem solving>.

Similar problem solving models can be found easily on the internet. Minor differences between the models are not crucial. Teachers can pick a model that suits them.

The Programme for International Student Assessment (abbreviated as PISA) is a triennial survey launched by the Organisation for Economic Co-operation and Development (OECD). It aims to evaluate the competency of 15-year-old-students around the world. Samples of 4,500-10,000 students from each participating country/area are randomly selected to take part in the assessments. Apart from written tests, students also fill out questionnaires regarding their personal background and learning experiences.

Means-Ends Analysis

Apart from the <7-step-approach to problem solving>, the Means-ends analysis is also commonly used in problem solving, especially in the field of artificial intelligence. The operating procedure is as follow: (1) Firstly, measure the difference between one’s current state and the goal state. If they differ on more than one aspect, start with the aspect with the largest difference; (2) Come up with a solution to reduce the difference; (3) The solution
used to reduce the difference will become the new goal. Repeat (1), ie. Measure your current state with the (new) goal state, and try to reduce the difference.

Let us look at an example:

**Situational Learning:**

It is 10am in the morning, I am packing my luggages. I have to take the train at 2pm to go back to my hometown for the Chinese New Year. My family left yesterday, but I had to stay behind for another day to take care of some businesses. I am alone at home. My kitty walks over and meows at me. It suddenly reminds me, “who is going to take care of the kitty while I am away?” Oh no! When I went on trips in the past, I usually asked my relatives who live nearby to take care of the kitty. However, they also have already gone back to the hometown for Chinese New Year this time. Who can take care of my kitty?

**My thinking process:**

I immediately think of SPCA and other pets hotels. However, I will not have enough time to bring my kitty over. What can I do? I am very worried. Then, I remember a good friend of mine who has four cats in her house. I can either bring my kitty to her house, or give her the keys to my house to look after the kitty. I call her immediately but no one answers. I try contacting her again through “Whatsapp”. After a few minutes, there is still no response. What can I do? I am very worried. Images of the kitty being helpless and lonely keep flashing through my mind. I know as long as I can find my friend, all the problems will be solved since she loves cats and will be more than happy to help. However, I am running out of time. Where can I find her? The clock is ticking...

I ask myself to calm down and think of a solution. I remember I can use the “Means-ends analysis” to solve problems. My current situation is me being home alone with my cat. My goal is to have my friend and my cat both present in my house. The difference between these two situations indicates that I need to come up with a method to let my friend get into my house. If she wants to enter my house when I am not around, she will need the keys to my house. The main focus has now become how I can pass my keys to her. I have already messaged her through “Whatsapp” to ask her to take care of my cat while I am away. I can call her again when I arrive at my hometown. Therefore, the biggest difference now is not about how to contact her or ask for her help. Instead, it’s how to pass my keys to her. I can give my keys to the security guard, or place them under the door carpet or the metal fence, but none of the options are safe. What about leaving my keys in the mailbox? It will not work either because she does not have the key to my mailbox. Then I think of another friend
who lives nearby. It will take me 10 minutes to reach his house by car. Although he does not
know how to take care of pets, he can pass on my keys for me. I call him immediately to ask
for his help regarding the keys. Luckily, he answers the phone immediately. Although he is
not at home, his helper is there and I can pass the keys to her. Problem solved!

In this case study, “the goal” is to have my cat-owner friend come over to my house. The
biggest “difference” is she is not in my house. In order to reduce the “difference”, I will need
to bring my friend to the house. The “means” is to let her have the keys to my house.
Therefore, her having the keys becomes the new goal. The biggest “difference” for that is I
am the one with the key, not her. Hence, I will have to think of solutions to reduce this
“difference”, ie. to give her my keys. Since I am unable to reach her, I cannot pass my keys to
her directly. I will have to seek help from a middle man.

Reflection: I understand that even though I have to leave my house, someone will be
able to enter my house as long as I leave my keys behind. Therefore, even if my cat-owner
friend is unable to take care of my cat, she can still ask someone to help and go to my house.
There is not enough time for me to try other methods this time. But once I leave my keys
behind, other methods such as getting help from SPCA or the pets hotel will all become
plausible solutions!

The “Means-ends analysis” is a problem solving strategy that can be used widely.
Students will be able to grasp the strategy with sufficient practices.

Knowledge station

Classification of problems

1. Researchers often classify problems into two main categories: well-defined vs.
   ill-defined. A 7-step-approach to problem solving can be used for both types of problems.

<table>
<thead>
<tr>
<th>Well-defined problems</th>
<th>Ill-defined problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>The initial state of the problem is clear. Problem solvers only need to make good use of the information they have.</td>
<td>The initial state of the problem is unclear. Problem solvers need to gather more information.</td>
</tr>
</tbody>
</table>
The goal of the problem is clear. The challenge lies in how to reach the goal.
The goal of the problem is unclear. Problem solvers need to set their own goals.
The approach or method used for problem solving is clear.
The approach or method used for problem solving is unclear. Problem solvers may come up with different solutions.
Example: Solving a mathematical problem
Example: Writing a good essay
The initial state is clear: The information provided in the question is sufficient, even though sometimes it may be necessary to clarify the hidden information.
The initial state is unclear: Although there is a given topic, the topic can be interpreted differently from different perspectives.
The goal is clear: e.g. Solve $X = ?$
The goal is unclear: It is difficult to determine whether an essay is good or bad. There are different criteria and standards.
The approach or method used for problem solving is clear: e.g. Addition, subtraction, multiplication and division etc.
The approach or method used for problem solving is unclear: Good writing can take many forms.

Table 2.1 Classification of problems

2. Some problems involve multiple stakeholders. In this case, the key for problem solving is not to find out the perfect solution, but to facilitate different stakeholders to reach an agreement, or accept a solution mutually. Most social issues belong to this type of problems. For example, should we implement waste levy, or how much should the rate be? There are no right or wrong answers. Instead, the decisions depend on whether or not the stakeholders can reach a mutual agreement for the sake of public interest.

Other examples include shall we implement TSA (Territory-wide System Assessment)? Where should we go for the school annual picnic? It can also be trying to settle some disputes (e.g. financial disputes, etc). In those situations the problem solvers often bring their own plans in the beginning, but the final decision is likely to be something that no one has anticipated. Further information can be found at https://en.wikipedia.org/wiki/Wicked_problem

Many political, economic and social issues have no once-and-for-all solutions. As time goes by, the society changes and the old ways no longer work. Effective solutions in the past may not be applicable to the present. We should accept new challenges courageously.
3. Real-life vs. textbook problems

“Three eggs are divided equally among four people. How many eggs can each person get? “

If this is a problem in a mathematics textbook, the answer will be 3/4 of an egg for each person.

However, this question will be much more complicated when it comes to reality. First of all, how can we separate 3/4 of an egg? Secondly, the size of real eggs varies. How can we divide them equally? A relatively plausible solution will be to break the eggs, scramble them, and use a measuring cup to divide the mixtures into four equal portions. Still, this is just a way to make it as fair as it seems.

Solving textbook problems often give an impression that the answers are not practical. There is some truth in it. When real-life problems are converted into textbook problems, they must be simplified in more than one way. Therefore, training students to apply some problem solving strategies to real-life problems will be a good opportunity for them to truly experience problem solving.
2.2 Critical thinking

Daniel Kahneman, the Nobel Memorial Prize laureate in Economic Sciences in 2002, urged us to rely on the slower, more deliberate and logical system 2 thinking in solving problems. This implies emphasising critical thinking in certain stages of the problem solving process (Table 2.2).

<table>
<thead>
<tr>
<th>Critical thinking</th>
<th>&lt;7-step-approach to problem solving&gt;</th>
<th>Creative thinking</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>Identify / define problem</td>
<td>✓</td>
</tr>
<tr>
<td>✓</td>
<td>Analyse possible causes</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Develop alternative solutions</td>
<td></td>
</tr>
<tr>
<td>✓</td>
<td>Evaluate each solution</td>
<td></td>
</tr>
<tr>
<td>✓</td>
<td>Select the best solution</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implement the solution</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaluate and reflect</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.2 Holistic thinking model

Take the case study “My phone cannot be charged” as an example. In the 1st step “Identify/define problem”, we need to decide whether the evidence we have is sufficient to determine that the problem comes from the cell phone itself. Likewise, critical thinking is required at the 2nd step “Analyse possible causes”, 4th step “Evaluate each solution” and 5th step “Select the best solution”. [Please refer to appendix 2 for a detailed explanation on critical thinking]

Take a look at another example. When we have fever, the core of the problem seems to be how to relieve the fever (e.g. Use an ice pack). However, fever is just a symptom but not the root of the problem. Similarly, there are times when the core of a problem is not what it appears to be on the surface. (e.g. Is being lazy the only explanation for students missing homework?). As a result, we need to rely on critical thinking to define the problem, and to see if the information we have is sufficient for us to determine the core of the problem.
From <7-step-approach to problem solving> to PSHE

While the <7-step-approach to problem solving> is used to solve problems in real life, teachers can make the following adaptations when the model is employed in the teaching of PSHE subjects:

(1) The educational purpose of PSHE case studies is not to train students to execute solutions. For example, in history subjects, the solutions suggested by students, no matter how perfect they are, can never be implemented. The educational goal is to train students to think from other people’s perspectives. This learning activity helps to reduce the importance of rote learning and foster the development of empathy. Therefore, it is not necessary to spend equal amount of time and effort on every step of the <7-step-approach to problem solving>. In particular, the last two steps should be handled flexibly.

(2) The title of each step in the <7-step-approach to problem solving> indicates the goal that needs to be achieved in that particular stage. Some teachers like to use a set of questions to guide students to focus at the learning points of each stage. Providing guiding questions is a good method because when students produce answers to those questions, they reach the goals for that stage.

Teachers may refer to the guiding questions listed in the table below:

<table>
<thead>
<tr>
<th>Holistic thinking skills (I) : Providing solutions for problems</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;7-step-approach to problem solving&gt;</td>
<td>Guiding questions</td>
</tr>
<tr>
<td>1. Identify / define problem</td>
<td>What goals do we have to achieve? / What problems do we need to solve? Are the goals clear enough and in no need of further study? Does the background information require any clarification? What is the core of the problem? #</td>
</tr>
<tr>
<td>2. Analyse possible causes</td>
<td>What are the causes of the problem? # Are there other root causes at a deeper level?</td>
</tr>
<tr>
<td>3. Develop alternative solutions</td>
<td>Why is the existing solution not good enough? Is there any innovative solution to the problem,</td>
</tr>
<tr>
<td>Step</td>
<td>Question</td>
</tr>
<tr>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>4.</td>
<td>Evaluate each solution</td>
</tr>
<tr>
<td>5.</td>
<td>Select the best solution</td>
</tr>
<tr>
<td>6.</td>
<td>Implement the solution</td>
</tr>
<tr>
<td>7.</td>
<td>Evaluate and reflect</td>
</tr>
</tbody>
</table>

# These two sets of questions can be used interchangeably according to learning needs.

Table 2.3 Guiding questions for 7-step-approach to problem solving

The 7-step-approach to problem solving will be further elaborated with the following example:

**Situational learning:**

Some students never read any newspapers. Some only read free tabloids. Some only care about entertainment and sports news. Some think newspapers only report disputes and
arguments so it is better not to read them. Imagine you were teachers of those students, call for a meeting to discuss a solution to the problem.

Holistic thinking skills (I)：Think about solutions to solve problems

<table>
<thead>
<tr>
<th>Holistic thinking skills (I)：Providing solutions for problems</th>
<th>Guiding questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;7-step-approach to problem solving&gt;</td>
<td></td>
</tr>
</tbody>
</table>
| 1. Identify / define problem                                  | What goals do we have to achieve? / What problems do we need to solve?  
(Student are not interested in reading newspapers)  
Are the goals clear enough?  
(No. The main goal is to encourage students to learn more about current issues. Reading newspapers is just one of the ways to do that.)  
Does the background information require any clarification?  
(Ways of access to news by students of different grades, academic capabilities and genders need to be clarified.)  
What is the core of the problem? #  
(Student do not care about current issues.)                   |
| 2. Analyse possible causes                                     | What are the causes of the problem? #  
(Some students think people are always arguing on newspapers, it is better not to read them; some students think news are irrelevant to school curriculum.)  
Are there root causes at a deeper level?  
(Student have poor comprehension skills; not interested in reading; busy schedules.) |
| 3. Develop alternative solutions                               | Why is the existing solution not good enough?  
Is there any innovative solution to the problem, which is also acceptable to others?  
(Teach students how to assess the validity of information, seek verifications; try |
<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduce other ways to let students know about news, such as organizing news assembly, introducing good websites for news, assigning homework on news topics, organizing competitions and other activities.)</td>
</tr>
<tr>
<td>4.</td>
<td>Evaluate each solution What are the pros and cons of each solution? Which solution is the best? (Consider the cost required, such as time and money; short-, medium- and long-term benefits; number of participants etc.)</td>
</tr>
<tr>
<td>5.</td>
<td>Select the best solution How can we refine the solutions /adjust the goals? What are the criteria for the “best” solutions? (Number of participants; sustainability of the result; whether the plan can be integrated with the school curriculum etc.)</td>
</tr>
<tr>
<td>6.</td>
<td>Implement the solution Does the implementation of the solution go according to the agreed plan? Does the solution create any new problems? (More time and effort will be devoted to the news reading tasks; the counter-effect of turning things into routine procedures and formalities.) Are there back-up plans? (Ask for opinions from different stakeholders; application of both reward and punishment system.)</td>
</tr>
<tr>
<td>7.</td>
<td>Evaluate and reflect Have you collected comprehensive information to facilitate the analysis? (Have you collected opinions from all students concerned?) Have you considered from the perspectives and benefits of different stakeholders? (Have you considered about the workload etc.)</td>
</tr>
</tbody>
</table>
Have you considered different possibilities and innovative suggestions? (For example, to learn about news through interdisciplinary activities, experiential learning and multi-media platforms.)

Have you considered the short-term and long-term consequences, and been prepared to address them?

Did any action in the problem solving process breach the moral principles of the society or your core values? (Consider about the learning diversity among the students and their workload; whether student will enjoy the learning process etc.)

Is there a balance between the ideal plan and the reality/available resources? (Have you had a good understanding about the manpower in school and the resources available?)

# These two sets of questions can be used interchangeably according to learning needs.

Table 2.4 Case analysis

(3) Some PSHE questions require students to evaluate a specific solution to a problem, for example, to evaluate the accomplishments of a historical figure, or assess a particular government policy. Those belong to the 4th step “Evaluate each solution” or 5th step “Select the best solutions” of the <7-step-approach to problem solving>. Teacher can use the following questions to guide students’ thinking in these two stages:

**Holistic thinking skills (II) : Evaluating solutions**

1. What did the stakeholder(s) say or do?
2. What were the alternative plans at the time?
3. Why did they choose to say/do that?
4. If they had chosen a different solution, what would have been the results (socially,
5. How would you choose if you were in that situation? What is the supporting evidence?

6. Do you have any innovative suggestions other than the options above?

7. How can you ensure that the solution would be implemented thoroughly? [The 6th step “Implement the solutions” of <7-step-approach to problem solving]

<table>
<thead>
<tr>
<th>Holistic thinking skills(II) : Evaluating solutions</th>
<th>Guiding questions for evaluating solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Identify / define problem</td>
<td></td>
</tr>
<tr>
<td>2. Analyse possible causes</td>
<td></td>
</tr>
<tr>
<td>3. Develop alternative solutions</td>
<td></td>
</tr>
<tr>
<td>4. Evaluate each solution</td>
<td>What did the stakeholder(s) say or do?</td>
</tr>
<tr>
<td></td>
<td>What were the alternative plans at the time?</td>
</tr>
<tr>
<td></td>
<td>Why did they choose to say/do that?</td>
</tr>
<tr>
<td></td>
<td>If they had chosen a different solution, what would have been the results (socially, culturally, politically, economically and environmentally)?</td>
</tr>
<tr>
<td>5. Select the best solution</td>
<td>How would you choose if you were in that situation? What is the supporting evidence?</td>
</tr>
<tr>
<td></td>
<td>Do you have any innovative suggestions other than the options above?</td>
</tr>
<tr>
<td>6. Implement the solution</td>
<td></td>
</tr>
<tr>
<td>7. Evaluate and reflect</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.5 Guiding questions for evaluating solutions
Self-monitoring centre

Critical thinking:
1. Is the information collected comprehensive enough?
2. Is the source reliable?
3. Is the evidence sufficient and reasonable?
4. Did I analyse the information objectively?
5. Have I considered other possibilities for the issue?
Apart from critical thinking, we also need to integrate creativity into the problem solving process in order to solve controversial issues, new problems, or simply to enhance the effectiveness of a problem solving plan.

For example, some Hong Kong students invented an ultrasonic cleaning system “Microscopic-bubbles Magic” that does not require washing powder. Its cleaning effect was even better than domestic washing machines. They won the Silver Award in the "2016 International Sustainable World (Energy, Engineering & Environment) Project Olympiad” in the United States.

<table>
<thead>
<tr>
<th>Critical thinking</th>
<th>&lt;7-step-approach to problem solving&gt;</th>
<th>Creative thinking</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>Identify / define problem</td>
<td>✓</td>
</tr>
<tr>
<td>✓</td>
<td>Analyse possible causes</td>
<td>✓</td>
</tr>
<tr>
<td>✓</td>
<td>Develop alternative solutions</td>
<td>✓</td>
</tr>
<tr>
<td>✓</td>
<td>Evaluate each solution</td>
<td></td>
</tr>
<tr>
<td>✓</td>
<td>Select the best solution</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implement the solution</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaluate and reflect</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.6 Holistic thinking model
What is creativity?

What is creativity? If we give this question a definitive answer, it will be against the true meaning of creativity. Many people in the past have come up with creative answers to this question. Let us have a look at what they say:

- People once said, “The first person who compared women to roses was a genius. The second person who did that was only mediocre.” (Why is that the case? What is the hidden meaning behind these two sentences?)

- Have you heard of the Chinese idiom story of “Plugging one's ears to steal a bell”? The thief in the story wanted to get rid of the sound of the bell. He covered his own ears so he could not hear the bell anymore. Do you think his approach is creative? (What is the flaw of his method?)

- A group of mice did not want the cat to catch them. They planned to tie a bell onto the cat, so whenever it came close, they would know. Was this method not innovative and effective? Why would people laugh at it? (Was this method completely useless?)

Psychologists suggest that creativity possesses three characteristics:

1. Novel
2. Valuable
3. Feasible

Can you evaluate the previous three examples using the characteristics above?

2.3.1 How is creativity generated?

A creative agent can be a person or a team. When a creative team is formed, the creator(s) can initiate the creative process and begin to construct different ideas. During the creative process, ideas will be constantly refined and different creative products will be produced in different stages.
2.3.2 Which is more important for creativity: Thoughts or actions?

Creative ideas are obviously important, but if there is no action, the goals will never be achieved. As a result, when we are constructing creative ideas, we also need to consider the feasibility of the plan. Ideas need to be put into actions in order to achieve the best result!
The importance of action:

Creation is produced through cycles of thinking, acting and revising.

- Creativity takes time to mature. It does not emerge instantaneously. As a matter of fact, creativity develops through practices and trials-and-errors (Sawyer, 2014).

Tidbits

Do animals have creative thinking?

http://www.bbc.com/future/story/20140723-are-we-the-only-creative-species
Retrieved on 13.5.2016

Do computers have creative thinking?

2.4 How to develop creativity?

1. Integrate areas of knowledge that seem unrelated on the surface
   a. Example: Young inventors make life easier
      (e-newsletter, 16.5.2016
       4513.shtml)
   b. Example: Getting a handle on health: Hong Kong teenagers invent
      self-disinfecting door handle (SCMP, 20.6.2015

2. Use analogy: XX is like YY.
   a. For example: Door is like a curtain because...
      Writing is like cooking because...

3. Personal aspects
   ➢ Think out of the box
   ➢ Remain curious and pay attention to things in the surrounding
   ➢ Allow ambiguity and uncertainty

Stumbling blocks to creativity

1. Negative mindset – for examples: “There are no other ways” “I am not good enough” “I am not talented in creative work”

2. Unnecessary fetters –
What will be the largest number if you can only move two matches?

Majority of the people will answer 9908. However, the questions did not specify the answer to be four-digit numbers. If you move two matches, you can even form a five-digit-number that starts with 6.

3. Habitual thinking

When you see a pair of scissors, you will easily associate it to paper cutting. Can scissors be used in other ways?

Self-monitoring centre

Creativity:
1. Did I think out of the box?
2. Is there any value in my creative product?
3. Will my creative product work?
Creative Cube

1. Pick three numbers randomly from 1-12. Find the pictures in accordance with your numbers from Figure 2.7.

2. Pick a number from 1-3. Your number represents one of the categories below.

   Category 1: Kitchenware
   Category 2: Furniture
   Category 3: Gardening tools

3. Use the pictures you have chosen in step 1 to create a tool that belongs to that category.

   (Adapted from Sawyer, K. (2013). *Zig Zag: the surprising path to greater creativity*. John Wiley & Sons.)
What is creative problem solving (CPS)?

After learning about creativity, we need to integrate creativity into problem solving.

1. Generating innovative solutions

Example 1: 9 dots puzzle

In Figure 2.8, how can we join all the dots with four or fewer continuous straight lines?

Answer:
When you breakthrough the minset of “lines must be drawn inside the box”, you will be able to come up with more alternative answers, such as the following:

![Figure 2.10 Answer for 9 dots puzzle (Version 2)](image)

Example 2: Solving traffic jams

Traffic congestions are very common in the modern society. The roads are always busy, especially during rush hours. In order to solve this problem, a designer came up with an innovative idea of Transit Elevated Bus (TEB). TEB has a very high base. When it moves on the road, it can glide over the traffic underneath. Therefore, TEB can maximize road usage and alleviate traffic congestions.

When the TEB prototype came out in 2010, it caught a lot of attention. Times magazine even selected it as one of the "50 Best Inventions of the Year 2010". Although TEB was recognized as a creative product, its practicality has been in doubt. Let us find out more about TEB in Activity (2).

![Figure 2.11 Transit Elevated Bus](image)
2. **Identifying problems that need to be solved**

**Example: The invention of Post-it notes**

In 1968, Dr. Spencer Silver, a scientist at 3M, was trying to create super strong adhesives but ended up with a low-adhesive glue by accident. The management of 3M did not find the glue very useful and left it aside. A few years later, a staff named Arthur Fry came up with an idea of applying the glue onto a piece of paper, so that the paper can stick to anything and be reused repeatedly. Eventually, Arthur submitted a production proposal to 3M, and created the post-it notes.
Figure 2.12 Creative problem solving (CPS) process
Have you noticed that the CPS process is very similar to the <7-step-approach to problem solving>? Actually, creative problem solving is developed on top of the concept of <7-step-approach to problem solving>. It emphasises integrating creativity in the 1st step and 3rd step of problem solving. When students are applying <7-step-approach to problem solving>, they can try to explore new questions in step 1 “Identify/define problem”, and think about innovative solutions in step 3 “Develop alternative solutions”. In that case, they will be able to integrate creative thinking into problem solving.

Apart from that, we can also use divergent thinking and convergent thinking tactfully in <7-step-approach to problem solving>. Divergent thinking is mainly used in the 2nd and 3rd steps, while convergent thinking is used in the 4th to 7th steps (Refer to Figure 2.12).

**Divergent thinking**

Characteristics of divergent thinking:

1. Associate freely
2. Accept all ideas
3. Think from multiple perspectives. Do not assume that there is only one answer to every question.
4. Suspend judgement on whether an idea is good or bad, or whether it is plausible etc.
5. Ideas can be constructed through brainstorming

---

Brainstorming is an effective way to promote divergent thinking. It can be divided into individual brainstorming and group brainstorming. Let us have a look at the focuses of these two approaches.

**Individual Brainstorming**

- Free association
- The more ideas the better
- Record everything that comes to mind
Group brainstorming

- Free association; gather different ideas; the more ideas the better
- Can integrate or refine ideas suggested by other members
- Suspend judgement on whether the idea is good or bad, or whether it is plausible etc.
- Each group selects a leader and a recorder
- One person speaks at a time
- Maintain a friendly atmosphere, avoid unconstructive criticisms

635 Brainstorming technique (Geschka, 1993) is commonly practiced during group brainstorming.

**635 Brainstorming (Geschka, 1993)**
- Form groups of six
- Each student write down three ideas for the same topic on the same piece of paper
- Pass the paper around for five times. Each student has to add three ideas everytime.

The following questions can be used as thinking guidelines for both individual brainstorming and group brainstorming.

<table>
<thead>
<tr>
<th>Substitute</th>
<th>What can be substituted?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combine</td>
<td>What can be regrouped or combined?</td>
</tr>
<tr>
<td>Adapt</td>
<td>What can be changed?</td>
</tr>
<tr>
<td>Magnify/minimize</td>
<td>Can you modify the characteristic of the orginal item?</td>
</tr>
<tr>
<td>Put to other use</td>
<td>Can some of the components be used for other purpose?</td>
</tr>
<tr>
<td>Eliminate</td>
<td>What can be taken away or streamlined?</td>
</tr>
<tr>
<td>Rearrange/reverse</td>
<td>Can the sequence be rearranged for a new effect?</td>
</tr>
</tbody>
</table>
Convergent thinking

The following steps are important for convergent thinking:

1. Set up selection criteria
2. Organise similar thoughts
3. Analyse existing data and select practical solutions
4. Choose the best solution

Brainstorming was proposed by Alex F. Osborn in 1953 (Applied Imagination). It was later developed into Creative Problem Solving (CPS). See http://creativity.buffalostate.edu/
Holistic Thinking Skills Rubric

The “Holistic Thinking Skills Rubric” is used primarily to evaluate students in the following aspects: problem solving ability; critical thinking; and creativity. Teachers can refer to the descriptions provided in Table 2.7 as assessment criteria. Student performance is differentiated into 3 stages: “Beginning”, “Developing” and “Mastering” stages. Teachers can make professional judgement based on the assessment criteria and students’ overall performances, and put a tick “✓” next to the description that best reflects a student’s learning abilities.

### Holistic Thinking Skills Rubric

<table>
<thead>
<tr>
<th></th>
<th>Beginning</th>
<th>Developing</th>
<th>Mastering</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Critical Thinking: enquiring and assessing</strong></td>
<td>□ ask questions to explore matters that attract interest</td>
<td>□ pose questions to explore issues related to their immediate contexts</td>
<td>□ pose questions that probe complex and abstract ideas about issues beyond local context and contemporary period</td>
</tr>
<tr>
<td></td>
<td>□ identify main ideas and clarify meaning in information</td>
<td>□ comprehend complementary and contradictory information</td>
<td>□ synthesise points from complementary and contradictory information</td>
</tr>
<tr>
<td><strong>Creativity: generating</strong></td>
<td>□ come up with new ideas by linking imagination and reality</td>
<td>□ draw parallels between known and new scenarios and use ideas, patterns and trends to consider new possibilities</td>
<td>□ generate a large number of raw ideas</td>
</tr>
<tr>
<td></td>
<td>□ create analogies by matching two ideas</td>
<td>□ produce alternative or unconventional solutions</td>
<td>□ combine good ideas to make even better ideas</td>
</tr>
<tr>
<td></td>
<td>□ brainstorm suggestions</td>
<td>□ suspend judgement to consider alternative ideas and actions</td>
<td>□ use existing knowledge in a novel way</td>
</tr>
<tr>
<td><strong>Critical Thinking and Problem Solving: analysing and comparing</strong></td>
<td>□ realise real world constraints in drafting solutions</td>
<td>□ estimate the cost and benefit of possible solutions from multiple perspectives</td>
<td>□ compare the possible outcomes of each solution against both their own and prevailing values</td>
</tr>
<tr>
<td></td>
<td>□ compare advantages and limitations of various solutions</td>
<td>□ rate and select solutions according to criteria, such as feasibility, desirability</td>
<td>□ mediate opposing viewpoints and</td>
</tr>
</tbody>
</table>
and ethical considerations

<table>
<thead>
<tr>
<th>Creativity and Problem Solving: predicting and fine-tuning</th>
</tr>
</thead>
<tbody>
<tr>
<td>- ask “what if” questions</td>
</tr>
<tr>
<td>- consider ways of tackling possible consequences</td>
</tr>
<tr>
<td>- make adjustments to avoid possible pitfalls (e.g. ambiguity, stereotyping and misunderstandings) in planning and presentation of solutions</td>
</tr>
<tr>
<td>- consider alternative courses of action in changing situations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Problem Solving: executing and monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>- choose a solution and devise an implementation plan, using support and advice given</td>
</tr>
<tr>
<td>- turn the plan into workable parts with measures for implementation</td>
</tr>
<tr>
<td>- execute the plan, monitor progress and revise the strategies when necessary</td>
</tr>
<tr>
<td>- realise the adverse effect of over-reacting and using emotional words</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Problem Solving and Critical Thinking: evaluating and reflecting</th>
</tr>
</thead>
<tbody>
<tr>
<td>- reflect on whether the task is accomplished</td>
</tr>
<tr>
<td>- be open to comments and feedback</td>
</tr>
<tr>
<td>- evaluate the quality of outcomes and the solution process</td>
</tr>
<tr>
<td>- invite and evaluate feedback</td>
</tr>
</tbody>
</table>

| - evaluate the effectiveness of solutions with due regard for positive values |
| - anticipate possible problems arising from the solution |
| - make judicious use of comments and feedback |

<table>
<thead>
<tr>
<th>Table 2.7 Holistic Thinking Skills Rubric</th>
</tr>
</thead>
</table>

Comments:
Real-life learning scenario: Traffic lights

Learning objectives:
1. Analyse problems with the <7-step-approach to problem solving> and find out the best solution possible.
2. Integrate critical thinking and creativity in the problem solving process.

During lunch hours, the area in front of the school is often over-crowded with pedestrians waiting to cross the road. Everyone complains that the waiting time for green lights is very long.

Apply holistic thinking skills to find out the best solution for the problem.

Individual exercise (Lower forms)

| Holistic thinking skills (I) : Providing solutions for problems |
|---|---|---|
| <7-step-approach to problem solving> | Guiding questions | Further illustration in the traffic lights example |
| 1. Identify / define problem | What goals do we have to achieve? / What problems do we need to solve? | During lunch hour, the area in front of the school is often packed with pedestrians waiting to cross the road. |
|  | Are the goals clear enough and in no need of further study? | Is the goal extending the duration of green light, or reducing the number of pedestrians crossing the road? |
|  | Does the background information require any clarification? | Do we need to collect data? For example, to record the intervals between signals; number of pedestrians crossing the road each time; categories of pedestrians |
| 2. Analyse possible causes | What are the causes of the problem? | (students/workers/housewives); the peak hour of people crossing the road. 
What is the core of the problem? Too many people crossing the road? The lights change too slowly or the greenlight time too short? 
Are there too many people out for lunch at the same time? 
Is there too little space to accommodate the crowd at the traffic lights? 
Are the facilities in the school cafetiera inferior or not adequate? 
Has the school not encouraged students to bring their own lunch? 
Do the students hate to stay in school for lunch? |
| --- | --- | --- |
| 3. Develop alternative solutions | Why is the existing solution not good enough? 
Is there any innovative solution to the problem, which is also acceptable to others? | Can the current traffic signal cycle balance the needs between vehicles and pedestrians? 
Can the traffic signal timing change flexibly according to traffic flow? 
Can the school co-ordinate with the factories and offices nearby to spread out the lunch hour? 
Does the school have resources to build a school cafeteria? 
Can the school encourage more students to bring their own lunch? |
| 4. Evaluate each solution | What are the pros and cons of each solution?  
Which solution is the best? | What are the cost, value and moral consideration for each solution?  
Which solutions are more feasible? (e.g. In terms of resources and policies)  
Can we adopt different solutions at the same time?  
Estimate the short-term, medium-term and long-term outcomes for each solution. |
|---------------------------|-------------------------------------------------|------------------------------------------------------------------|
| 5. Select the best solution | How can we refine the solution/adjust the goal? | Can we reach mutual agreement upon the criteria for “the best solution”?  
Have we listened to the opinions from the stakeholders regarding each solution?  
Can we prioritize the solutions based on their short-term, mid-term and long-term impacts? |
|---------------------------|-------------------------------------------------|------------------------------------------------------------------|
| 6. Implement the solution | Does the implementation of the solution go according to plan?  
Does the solution create any new problems?  
Are there any back-up plans? | What are the strategies and procedures needed for the implementation of the chosen solution?  
Do we need to form a task group? Who will be in the group?  
When will the work start? How to commence?  
Are there any new problems that may arise during the implementation of the solution?  
How to tackle the new problems? |
|---------------------------|-------------------------------------------------|------------------------------------------------------------------|
7. Evaluate and reflect

| Have you collected comprehensive information to facilitate your analysis? |
| Have you considered from the perspective and benefit of different stakeholders? |
| Have you considered different possibilities and innovative suggestions? |
| Have you considered the short-term and long-term consequences, and been prepared for them? |
| Did any action in the problem solving process breach the moral principle of the society or your core value? |
| Is there a balance between the ideal plan and the reality/available resources? |
| Have we done sufficient data collection throughout the problem solving process? |
| Have we consulted relevant stakeholders? |
| Has the situation of over-crowdedness changed? Do we need to adjust the goal? |
| The chosen solution has been revised to meet real-life application. Is it still the best solution available? |
| Can the task group work effectively? Do we need to make any fine adjustments? |
| Have the resources been used effectively and striven to maximum to reach the goal? |
| Have the goals and strategies been revised after considering the real-life application? |

# These two sets of questions can be used interchangeably according to learning needs.

Teacher can also ask students to carry out the following activities or reflect on the questions:

- Record the traffic signal cycle lengths near the school (data collection).
- What are the factors that need to be considered while making decisions for the duration of traffic signals?
- Are the factors you observed the same as what you expected?
- Do you think the duration of the traffic signal cycle near the school is reasonable?
**Action learning (Higher forms)**

Teacher can ask students to carry out the following activities:

- Interview the pedestrians to find out if they think the duration of traffic signal cycle is reasonable.
- Interview the experts at the Transport Department to learn about how they design the traffic signal system.

**Challenging question**

A new sports stadium opened near the school a few months ago. On days of big events, the roads leading to the stadium were jammed with traffic. It was found out that the green light at an intersection near the stadium had a very short cycle. Only a few vehicles could pass through at every interval. Another road in the intersection led to the residential areas and schools. The green light on that road had a longer cycle.

How can we arrange the intersection to reduce traffic jams on days of big events? The solution also needs to minimize any inconvenience caused to the residents and students in the neighbourhood.

![Intersection Diagram](image)

**Assessment Guidelines**

Teacher may refer to the “Holistic Thinking Skills Rubric” in P.57-58.
Real-life learning scenario: Online shopping scams?

Learning objectives:
1. Analyse problems with the <7-step-approach to problem solving>, and find out the best solution possible.
2. Integrate critical thinking and creativity in the problem solving process.

Becky saw a beautiful ornament on the IGIG website and decided to buy it. After she contacted the seller, she was told to transfer the payment into a bank account and fax/email the payment receipt to the seller. Three weeks passed by, Becky had not received her ornament. She contacted the seller again. The seller told her that the ornament was shipped a long time ago, and questioned Becky if she had checked her mailbox.

Becky suspected that she has been scammed. She wanted to call the police, and came for your advice.

Further information can be found in the following websites:
https://www.youtube.com/watch?v=Z0cc3GvB23A

Individual exercise (Lower forms)
1. Do you think Becky should contact the police? Solve the problem with holistic thinking approach, and give Becky some advice. (See P. 57-58 for assessment rubric)
Real-life learning scenario: Wrong mailing address

Learning objectives:
1. Analyse problems with the <7-step-approach to problem solving>, and find out the best solution possible.
2. Exercise your creativity and find out an innovataive and feasible solution.

Emma signed up for a drawing competition. The organizer required all the contestants to submit their artwork to the UK office by 10th June, 2016. Since the average delivery time for speed post to England required 2-6 days, Emma sent out her artwork on the 3rd June. However, on the night after she mailed out the artwork, she found out that she had accidentally written down a wrong address on the parcel. If she were to wait for the parcel to mail back from the wrong address and resend it to the organizer, it would not be able to arrive the destination before the deadline. If you were Emma, what would you do?

Individual exercise (Lower forms)

1. If you were Emma, how would you solve the problem? Provide a solution using holistic thinking skills. (See P. 57-58 for assessment rubric)
Religious Studies

Buddhism – Provided in the Chinese version only.

Life and Society

Notwithstanding strong calls from many environmental organisations against the consumption of shark fin soup, the dish still firmly holds its position as a popular choice for Chinese wedding banquets. Assume that you are a member of Environmental Conservation Club. Discuss a feasible method to promote saying no to shark fin soup.

Objectives of the class activity:
- Learn about the process of shark finning
- Study the regulations on the sale of shark fins of different countries
- Discuss a feasible method to promote saying no to shark fin soup in use of holistic thinking skills

<table>
<thead>
<tr>
<th>Holistic thinking skills (I) : Providing solutions for problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seven steps</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>1. Identify / define the problem</td>
</tr>
<tr>
<td>2. Analyse possible causes</td>
</tr>
<tr>
<td>3. Develop alternative solutions</td>
</tr>
<tr>
<td>4. Evaluate each solution</td>
</tr>
<tr>
<td>5. Select the best solution</td>
</tr>
<tr>
<td>6. Implement the solution</td>
</tr>
<tr>
<td>7. Evaluate and reflect</td>
</tr>
<tr>
<td>Question</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Have different possibilities and new suggestions been considered?</td>
</tr>
<tr>
<td>Have the short- and long-term influences of the decision been considered and have any relevant preparations been made?</td>
</tr>
<tr>
<td>Have we made any action against social morals or our own core values during the entire problem solving process?</td>
</tr>
<tr>
<td>Have we struck a balance between the ideal and the actual circumstances / existing resources?</td>
</tr>
</tbody>
</table>

Refer to Appendix V for detailed lesson plans by subjects
Chapter 3
Holistic thinking skills (II)

Cognitive tools

Chapter focuses
① What are cognitive tools
② Understanding the advantages of using cognitive tools
③ Recognizing different cognitive tools
④ How to apply cognitive tools in holistic thinking
**Suggested teaching activity combinations**:

<table>
<thead>
<tr>
<th>Combination (to be selected according to student needs)</th>
<th>Content</th>
<th>Time</th>
<th>Related teaching materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Understanding cognitive tools</td>
<td>10 min</td>
<td>P.71–89</td>
</tr>
<tr>
<td></td>
<td>Applying cognitive tools</td>
<td>30 min</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Real-life learning scenario</td>
<td>40 min</td>
<td>P.90–95</td>
</tr>
<tr>
<td>3</td>
<td>Case studies in PSHE subjects</td>
<td>40 min</td>
<td>Appendix V</td>
</tr>
</tbody>
</table>
3.1 Understanding cognitive tools

- We may use cognitive tools to overcome different obstacles in the process of using the 7-step-approach to problem solving.
- Most cognitive tools are visual representations that expose the inner or hidden structure of a problem. Visual representations can assist students in their thinking and strengthen their cognitive functioning (Iiyoshi & Hannafin, 2002).
- Learners can use cognitive tools for collecting, organizing, processing, and presenting data and information.
- We should not confine ourselves to "popular" cognitive tools such as mind maps. In a broad sense, all tools that can facilitate learners' thinking are cognitive tools. They include paper, pen, and models etc. (Bao & Zhang, 2005). We can also create our own cognitive tools to tackle particular tasks.
- Note that cognitive tools should be used to assist students in thinking, rather than to limit their thoughts (Chen, 2001).

3.1.1 Advantages of cognitive tools

- Help students organize thoughts visually and express ideas clearly.
- Delineate the relationship between items.
- Reduce cognitive load, such as the limits in working memory capacity.
- Help learners construct and plan their ideas, and act as a tool for discussion.
3.2 Recognizing different cognitive tools

3.2.1 Table

The table is the most practical cognitive tool. Information is organized in a row by column format systematically to enable (1) comparison of data across different categories (e.g. The comparison between two columns); (2) review of the relationship between information (e.g. Between rows and columns).

<table>
<thead>
<tr>
<th>Comparison between Hong Kong, Tokyo and Seoul</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong</td>
</tr>
<tr>
<td>Population</td>
</tr>
<tr>
<td>Area</td>
</tr>
<tr>
<td>XXX</td>
</tr>
</tbody>
</table>

Table 3.1 Comparison of population and area among Hong Kong, Tokyo and Seoul

Prevalence of Hong Kong smokers above 15-year-old in 2010, 2012 and 2015

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2012</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>586 800</td>
<td>548 200</td>
<td>538 300</td>
</tr>
<tr>
<td>Females</td>
<td>112 000</td>
<td>96 800</td>
<td>103 000</td>
</tr>
</tbody>
</table>

Table 3.2 Comparison of Hong Kong smokers above 15-years-old in 2010, 2012 and 2015

To draw a table, we need to find out the key variables from the information. After that, we insert the category names of the variables into the first row and column. Then, we fill in the blanks with the corresponding values or information. After all the values or information are entered, we can analyse the data and extract the information that we need.

Example 1 :

Mr. Chan is an electrician. He has contracted with three shops A, B, and C to repair their electrical appliances on the same day. Shop A closes in the afternoon; shop B closes in the morning; shop C opens from the morning to the evening, but the owner hopes to have the
devices repaired before dinner. If it takes 3-4 hours for Mr. Chan to repair the appliances for each shop, how should he plan his schedule for the day?

This problem can be solved easily once the information is converted into the table format, as follow:

![Table 3.3 Mr. Chan’s schedule of the day](image)

### Table 3.3 Mr. Chan’s schedule of the day

- **Think**
  - Is there only one possible arrangement for Mr. Chan’s schedule?
  - Can the table above indicate the other arrangements?

- Apart from the table format in example 1, have you thought of the following format?

<table>
<thead>
<tr>
<th>Morning</th>
<th>Afternoon</th>
<th>Evening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shop A</td>
<td>Shop B</td>
<td>Shop A</td>
</tr>
<tr>
<td>Shop C</td>
<td>Shop C</td>
<td>Shop B</td>
</tr>
</tbody>
</table>

**Table 3.4 Mr. Chan’s schedule of the day**

- Can you explain Table 3.4? What are the differences between Tables 3.3 and 3.4? Which one do you think is better?
3.2.2 The Fishbone diagram

In everyday life, we often have to analyse the causes of problems. Fishbone diagram acts as a thought-visualization tool to help us identify the major and minor causes of each problem. It may also help us identify the root of the problem. Fishbone diagrams are particularly useful in situations with multiple causes with the same outcome.

Fish bone diagrams can be classified into two types:
A. Cause-and-effect fishbone diagram

The cause-and-effect fishbone diagram is commonly used to analyse the causes of a problem. The head of the fish is drawn to the right of the paper, with the effect (outcome) of the incident written on it. Connected to the head are the fishbones, which are used for analysis of the causes leading to the incident.

Steps for drawing a cause-and-effect fishbone diagram:

(1) Write down the current situation/problem on the fish head;
(2) Draw a horizontal line from the fish head to the fish tail to represent the backbone;
(3) Attach some bones to the backbone, and list out all the major causes for the incident/problem;
(4) Add some small bones onto the bones, and drill down the factors that contribute to the major causes;
(5) Go through each factor, and circle the most significant cause.

Example 1:

![Diagram](image)

Figure 3.2 Example of a cause-and-effect fishbone diagram
B. Strategic fishbone diagram

Strategic fishbone diagram is very similar to the cause-and-effect fishbone diagram. They both consist of a fish head and the fish bones. However, this time, the fish head is on the left-hand side. The problem to be solved or the purpose of the event should be written down on the fish head. The solutions to the problem should be written down on the fishbones.

Steps for drawing a strategic fishbone diagram:

1. Write down the problem that needs to be solved/purpose of the event on the fish head;
2. Draw a horizontal line from the fish head to the fish tail to represent the backbone;
3. Attach some bones to the horizontal backbone, and write down the dimensions or stakeholders that may be involved;
4. Add some small bones on the big bones, and list out the contribution from each dimension or stakeholder;
5. Examine each solution, and arrange them according to their priority.

Example 2:

![Strategic fishbone diagram example](image-url)

Figure 3.3 Example of a strategic fishbone diagram
3.2.3 Flowchart

The flowchart is a diagram that shows the sequence of steps in a process. A flowchart can be used to show the manufacturing procedure of an item, or a step-by-step solution to a problem. The steps are represented by boxes of various shapes. Arrows are used to connect the boxes to indicate the direction of flow from one step to the next. A typical way to branch out is to use 'yes' and 'no' at a decision step.

In the previous chapter, we have learnt how to solve the “My phone cannot be charged” problem with the <7-step-approach to problem solving>. Now, let us take a look at how we can use cognitive tools to solve the same problem.
Figure 3.4 Example of a flowchart
3.2.4 Mind map

The mind map is also a cognitive tool widely used in daily lives. It is commonly deployed in research, organization of information, problem solving and policy-making. It starts with a central keyword or idea, and links all the relevant words or tasks through lines. The theme is in the centre, and from the centre ideas will be added layer by layer. Eventually, the diagram expands into different branches of information.

Example 1:

![Figure 3.5 Example of a mind map](image-url)
3.2.5 Timeline

The timeline is a cognitive tool commonly used to arrange activities and procedures in a chronological order. We mark the events on a timeline in accordance with their time of occurrence to facilitate analysis or planning. In particular, for historical events, we often use a timeline to show the progression of incidents. Note that the timeline only illustrates the order of the events but not the causal relationship between the incidents, which is usually more complicated than that can be shown in a timeline.

Example 1:

![Image of a timeline showing the Second World War in Europe and The Pacific.]

Figure 3.6 Example of a timeline

3.2.6 Logic tree

The basic principle of the logic tree is to unfold a problem logically into different layers according to the characteristics of the research subject. In each layer, all research subjects should be classified into one of the categories, so that the final solutions cover the needs of
all subjects. After that, we can start looking for solutions targeting each category. When looking for solutions, we should find out the bucket size of each category (the number of each research subject) through data collection. Emphasis should be placed on those categories with large bucket sizes.

Example 1: How to improve the examination results of the students in the class

![Figure 3.7 Example of a logic tree](image)

After allocating students into different categories, collect data and produce solutions for each category.

### 3.2.7 Value matrix

There is usually more than one solution for a problem. The <7-step-approach to problem solving> reminds us to “select the best solution”. How do we know which solution is the best, the most desirable, the most cost-effective or the most popular?

We can weigh the pros and cons of any solutions on three aspects: (1) Cost effectiveness; (2) Risk analysis; and (3) Moral consideration.
(1) Cost effectiveness

To calculate the cost effectiveness, we can compare the cost of a solution against its value. Cost includes monetary cost, time cost, physical and psychological cost (intangible, such as trust between people) etc. Normally, people are more concerned about monetary cost because it can be expressed in units that people commonly understand. Time, physical and psychological costs are difficult to measure and sometimes neglected. For example, in the case study “My phone cannot be charged”, with other conditions being the same, we will take the solution with the lowest cost as the best. However, if solution A is slightly cheaper than solution B, but requires double amount of time, is it still the best solution? Or, you and your family plan to go on travelling for a week during the summer holiday. Plan A is to take a direct flight. Although the fare will be more expensive, you will be able to arrive at the destination in a few hours. Plan B is to take an indirect flight. Although the fare will be cheaper, you will have to stay in the transit airport for a few hours in the middle of the night, and take a whole day to arrive at the destination (ie. investing a lot of time, physical and psychological cost). Which plan would you consider better? The answer to this question differs between people. Some people may think that convenience and efficiency are more important than monetary cost, whereas others may think the opposite. Hence, which one is the “best solution” depends on situational factors as well as people’s perspectives. We need to look at the whole picture and measure the cost effectiveness from a macro perspective before making a decision.
The tables below show four different characters and four combinations of solutions. Which combination do you think each character will prefer?

<table>
<thead>
<tr>
<th>Character</th>
<th>(1) A young traveller</th>
<th>(2) An old traveller</th>
<th>(3) A young businessman</th>
<th>(4) An old businessman</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Solution</th>
<th>Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Budget flight</td>
</tr>
<tr>
<td>2.</td>
<td>Budget flight</td>
</tr>
<tr>
<td>3.</td>
<td>Regular airline</td>
</tr>
<tr>
<td>4.</td>
<td>(Combinations suggested by students)</td>
</tr>
</tbody>
</table>

Table 3.5 Combinations of flying plans

Value matrix is a cognitive tool commonly used to compare the pros and cons of solutions. The matrix contains four quarters formed by the intersection of two axises. The X-axis usually shows the Cost and the Y-axis the Value. We can compare the cost effectiveness of the solutions by marking each one on the graph in accordance with its corresponding cost and value. The solutions with low cost and high value are better than those with high cost and low value.
In the following, we use the problem “MTR train crowding during peak hours” to illustrate how to use the value matrix to select a desirable solution. Firstly, we mark all the solutions onto their corresponding locations in the value matrix. Then, we can choose the best solution among them.

**Solution 1:** Increase the frequency of trains during peak hours  
**Solution 2:** Use trains with more cars during peak hours  
**Solution 3:** Allocate more MTR staffs for crowd control during peak hours  
**Solution 4:** Procure more trains for the passengers

From Figure 3.8, we can see that solution A and B are more desirable because their costs are low and their values high. Although the cost for solution C is also low, its value is low too. Lastly, the cost of solution D is high, but its value is only average.
Yet, let us not forget that the cost of a solution may be assessed differently depending on the situations and perspectives. For example, if there are not enough trains, solution D (purchase extra trains) will be a plan with high cost and high value. However, if it is sufficient, the value of solution D will decrease. Therefore, the value matrix produced by different people under different circumstances or from different perspectives will also be different.

(2) Risk analysis

Risk analysis is another way to assess the pros and cons of a solution. Risk consists of two dimensions: (1) How likely the plan will fail; (2) How serious the consequence will be if the plan fails.

If the solution has a high chance of failure, it is a high-risk solution. Similarly, if a failure of the solution will lead to a serious consequence, it will also be classified as high-risk. Students can analyse the risks associated with a solution using the value matrix. It is a useful tool to help them choose the right solution.

Some subjects (e.g. Economics) consider risk as a part of the cost. In this section, we single out risk analysis to remind students that there is a possibility that their solutions will fail. They also need to think about the consequences if their solutions fail. Teachers can combine cost and risk if they find it more suitable.
Consider the following example. A farmer was planning to plant some olive trees. He found a good piece of land (A): the soil, the drainage system and other aspects were all suitable for planting olive trees. The only problem was that there were three records of mountain fires in the area in the past ten years. There was another piece of land (B), though not in as good as land (A), had never had any mountain fire before. Given these conditions, which land should the farmer choose?

Clearly, if the rate of return is nearly the same, we should choose land (B) to avoid the risk of mountain fires. However, what if the difference in rate of return is huge? High return may come with high risk. In that case, we need to carefully decide if we should take the risk, or choose a solution with both lower effectiveness and risk.

The previous case is a simplified example. In reality, the process of risk analysis is much more complicated. The risk that each person is willing to take is different. It depends on their age, background or social culture. Therefore, apart from objective evaluation, risk analysis also includes subjective views. Once we have estimated the risk, the next step will be to explore if there are any ways to reduce the risk. After that, we should decide if we should...
adopt them. In short, it is important to perform a risk analysis before we commit to a plan.

(3) Moral consideration

Apart from cost effectiveness and risk analysis, we also need to consider the moral aspect when we evaluate the solutions.

1. Which solution can benefit the most people?
2. Is the solution in accordance with the moral standard of the society? (e.g., respecting other people, life and the natural environment)
3. Will a virtuous person agree with the solution?
4. Will the solution bring about unintended impacts?

These questions are about something we should not ignore. For example, suppose a factory owner is deciding how to treat the factory sewage. If he discharges the sewage directly into the lake nearby, his cost will be near zero. However, doing so will contaminate the water and adversely affect the ecosystem. Hence, even though the cost effectiveness of this approach is high, it is NOT a desirable solution.

When selecting solutions, we need to consider their cost effectiveness and moral implication at the same time.

The “2008 Chinese milk scandal” can be used to teach students about the importance of moral consideration in decision-making.
1. The government intends to build a waste incinerator to ease the current pressure on waste disposal. If the incinerator is built in the rural area, the cost for waste transportation will be very high. If the incinerator is built in a suburban location, emission from the waste incineration will affect the people nearby. Which alternative do you think the government should choose? When the government is deciding on the site, is the plan with the least number of objections the best plan?

2. In 2000, the Kowloon-Canton Railway Corporation (KCRC) planned to construct the Lok Ma Chau Spur Line and proposed to build viaduct across the Long Valley wetland to reduce cost. The plan was strongly opposed by environmental activists because the viaducts would cause significant damage to the ecosystem of the wetland. If you were the person in charge of KCRC, how would you handle the issue? (Teacher can provide information on the final solution of KCRC after the class discussion.)

3. You are the manager of an agricultural company. The meeting today is to discuss how to improve company performance. One of your colleagues suggests that your company should follow other competitors and increase the use of hormones and pesticides for a higher crop yields. Other colleagues think it is unethical, and should not be adopted. If the company performance cannot be improved in a short period, you will be fired. How will you choose?
Cognitive tools are instruments that help us organise ideas and summarise information in the problem solving process. We need to adopt a holistic thinking mindset whenever possible. This includes integrating critical thinking and creativity into problem solving. Let us revisit the “Self-monitoring centre” we have learnt in the previous chapter:

**Self-monitoring centre**

**Critical thinking**
1. Is the information comprehensive?
2. Is the source reliable?
3. Is the evidence sufficient and reasonable?
4. Did I analyse the information objectively?
5. Have I considered other possibilities?

**Creativity**
1. Did I think out of the box?
2. Does my creative product have any practical use?
3. Is my creative product feasible?

Apart from asking students to construct their cognitive tools to solve problems in class, teachers can also provide source information in the form of cognitive tools (e.g. charts) for students to analyse. See Appendix (V) for examples.
Every year, the student association organizes a talent show and invites teachers and students to perform on stage. In the past, many people signed up to watch the show, and the hall was usually fully occupied. But since last year the number of audiences has dropped drastically. Only one-third of the hall was filled.

Lucy is the person in charge of the talent show next year. She hopes to find out the cause of the problem and work out a plan so that the number of audiences will increase next year. She has collected some information from her fellow schoolmates. Some of them responded that they did not attend the previous show because they did not know the date or time of the show. Some of them knew about it but were unable to attend because of a clash with the choir practice. Some students had attended once before but were not interested in watching again. How do you think Lucy should solve these problems so that the number of audiences can increase next time?

Knowledge recap

7-step-approach to problem solving
1. Identify/define problem
2. Analyse possible causes
3. Develop alternative solutions
4. Evaluate each solution
5. Select the best solution
6. Implement the solution
7. Evaluate and reflect
Drastic decrease in the number of audience for the talent show

Problems usually have more than one cause. If we try to find the corresponding solution to each cause, we will need to process a lot of information at the same time. Therefore, we can use cognitive tools to help us categorize the information so that we can have a clearer view of the whole picture.

**Cognitive tool: Logic tree (See P.80-81)**

Divide audiences into different categories. Each audience will fall into one of the categories.

![Logic Tree Diagram]

After creating these logical categories, we can employ various data collection methods to identify the number of samples in each category to find out the bucket size of each category.

**Methods of data collection:**
1. Observation
2. Questionnaire
3. Interview
4. Experiment
5. Action Research

To collect the students’ attendance figures, Lucy prints out 600 questionnaires for
teachers to distribute to their respective classes. The following Figure shows the processed data:

![Figure 3.12 Data in a logic tree](image)

Lucy discovers that 30% of the students did not know that there was a talent show. 50% of them knew about the show but were not able to attend. Among those students, many of them could not attend because they had choir practice during lunch time.

**Step 3: Develop alternative solutions**

**Cognitive tool: Table (See P.72-73)**

After we have found out the bucket size of each category, we can look for solutions for each cause. Emphasis should be placed on those categories with large bucket size. Those with smaller bucket size can be skipped if necessary.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Many students do not know the date and</td>
<td>Make announcement during morning assembly; deliver promotion in class and</td>
</tr>
<tr>
<td>time of the talent show</td>
<td>design posters</td>
</tr>
<tr>
<td>2. Many students need to attend choir</td>
<td>Ask the music teacher for the schedule of choir practice and organize the talent show on the other dates.</td>
</tr>
<tr>
<td>practice at lunch time</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.6 Use table to illustrate the possible causes and their corresponding solutions
Step 4: Evaluate each solution

Cognitive tool: Value matrix (See P.81-86)

Figure 3.13 Value matrix

Step 5: Select the best solution

Making announcements in morning assembly, promotion in class and checking the schedule of choir practice all belong to solutions with low cost and high value. Thus, they are of a higher priority. As for posters, although their value is high, the cost is also comparatively high. We can decide whether or not to use this option depending on our available resources. Even if we have enough budget, it is not a must for us to try this solution. Do you know why?

Everyone has a distinct view on “the best solution”. For example, although the cost of posters is high, some people may think it is worth investing. On the other hand, others may prefer more morning announcements than spending money on posters. Some people may also think that because the budget for student association comes from all the students, it should not be spent on an activity that does not involve a majority of the students.
After evaluating the cost effectiveness, we also have to consider the risk and moral implication. The solution will be worth adopting only if it can also satisfy these two requirements.

**Cognitive tool: Table (See P.72-73)**

<table>
<thead>
<tr>
<th>Solution</th>
<th>Cost effectiveness (Low/medium/high)</th>
<th>Risk analysis (Low/medium/high)</th>
<th>Moral consideration</th>
<th>Chosen solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making announcement in morning assembly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class promotion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poster design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checking the schedule for choir practice with the teacher</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.7 Table comparing different solutions
Step 6: Implement the solution

- Timeline (Place the free and convenient solutions first. Then move on to the ones that require more resources)
- Flowchart (Show the next step after verifying the effectiveness of the solution such as “Effective” or “Not effective”)

Step 7: Evaluate and reflect

Teachers can design assessment tools in the light of the “Holistic Thinking Skills Rubric” in Chapter 2, or guide students to reflect on the following questions (examples):

1. Have I identified all the possible reasons for the decrease in audience number?
2. Have I considered the solutions from a long-term perspective?
3. Have I carefully considered and evaluated the cost and value of each solution and anticipated the new problems it may bring along?
4. Have I prepared solutions to tackle the new problems?
5. Do I have any back-up plans?
Chapter 4

Collaborative Problem Solving Skills (I)

Collaboration Skills

Chapter focuses

1. Understanding various grouping strategies
2. Learning about different functional roles in a group
3. Learning to solve problems with respectful and structural communication
4. Learning to use appropriate communication skills in groups
### Suggested teaching activity combinations:

Double periods of 80 minutes

<table>
<thead>
<tr>
<th>Combination (to be selected according to student needs)</th>
<th>Content</th>
<th>Time</th>
<th>Relevant teaching materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to collaborative problem solving skills</td>
<td>20 min</td>
<td>P. 98-101</td>
</tr>
<tr>
<td>1</td>
<td>Recognising different roles of group members</td>
<td>20 min</td>
<td>P. 103-110</td>
</tr>
<tr>
<td>1</td>
<td>Mastering appropriate group collaboration and communication skills</td>
<td>40 min</td>
<td>P. 119-129</td>
</tr>
<tr>
<td>2</td>
<td>Learning to solve problems with respectful and structural communication</td>
<td>40 min</td>
<td>P. 111-118</td>
</tr>
<tr>
<td>2</td>
<td>Mastering appropriate group collaboration and communication skills</td>
<td>40 min</td>
<td>P. 119-129</td>
</tr>
<tr>
<td>3</td>
<td>Real-life learning scenarios</td>
<td>80 min</td>
<td>P. 136-147</td>
</tr>
<tr>
<td>4</td>
<td>Application in PSHE subjects</td>
<td>80 min</td>
<td>Appendix V</td>
</tr>
</tbody>
</table>
Collaborative problem solving skills refer to the integrative use of communication skills, collaboration skills and problem solving skills.

According to PISA (2015), **collaborative problem solving skills** involve three aspects:
1. Establishing a shared understanding of the problem and the problem solving objectives among group members
2. Taking appropriate problem solving actions
3. Establishing and maintaining group organisation

PISA’s description on collaborative problem solving skills aligns with the above diagram. All group members need to have effective communication skills and methods for the establishment of a shared (or similar) understanding of the problem as well as the problem solving objectives. It is also necessary for group members to reach an agreed problem solving plan and work as a team during implementation. Throughout the process, group members need to establish a team structure in which members can take their respective roles, put their strengths to use and offer support to each other. Furthermore, group members need to have good communication skills and an open attitude to collaborate with people of different personalities, specialties and cultural backgrounds. It is not enough for one to only offer expertise, but also to create rooms for others to make contribution.

A few suggestions on problem solving methods and creative problem solving have been provided in Chapters 2 and 3. In this Chapter, let’s discuss the points to note in the collaborative problem solving process with regard to three aspects, namely, forms of groups, roles of group members and communication skills.
4.1 Why form groups?

This question seems redundant - it is quite obvious that working as a group is better than working individually. While effective group collaboration enhances problem solving or generation of innovative ideas, this is true to the extent that a group can collaborate efficiently. Let’s look at the figure below:

![Figure 4.1 Performance levels of group collaboration](image)

**Figure 4.1 Performance levels of group collaboration**  
Adapted from Cheruvelil et al. (2014)

The five circles to the left of the figure represent the personal performance of five group members. In case a group fails to operate in an effective manner, it is not guaranteed that the group as a whole will outperform individual members. If the strongest member dominates the group, the level of that member would represent the best performance of the group (imbalanced groups). We all prefer high-performing collaboration, don’t we? Let’s discuss how to achieve such an ideal state.
4.2 How to form groups?

Discussion Zone

1. In your opinion, is the following an ideal way of group learning? Why?

There are 4 members in John’s group. They have to give a 10-minute presentation on “Should domestic waste charging be implemented?” in class next week. They stay after school to discuss their group’s stance. As all members support environmental protection, they all agree with the charging. Then they decide that each of them will jot down a few points to support their stance at home and to discuss their points on the following day.

2. How would you describe the above group learning?
A. Division of work
B. Group collaboration
C. Working on their own

3. In your opinion, what makes an effective way of group learning?

“Division of work” may simply involve dividing a task into certain parts, each to be completed by individual members independently. Then each part will be combined afterwards. There is no interaction among members throughout the entire process. This is the “production line” mode used in factories.

“Group collaboration”, on the other hand, emphasises interaction among group members during the work process, which includes communication and mutual support.
Woods (1994) pointed out that an effective collaborative group needs team spirit:

<table>
<thead>
<tr>
<th>A group without team spirit</th>
<th>A group with team spirit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each member has his/her own goals</td>
<td>Each member accepts the group’s goals and is willing to sacrifice personal goals for achieving the group’s goals</td>
</tr>
<tr>
<td>Members’ roles are not clear</td>
<td>Each member bears a clear role, knowing how to make contribution for the group</td>
</tr>
<tr>
<td>Decisions are made by vote such as by plurality</td>
<td>Decisions are made through negotiation, by which the best solution for the group will be accepted</td>
</tr>
<tr>
<td>An evasive attitude may be adopted when conflicts arise</td>
<td>There is an agreed method to deal with conflicts</td>
</tr>
<tr>
<td>No attention is paid to the absence of group members</td>
<td>If any member is unable to attend the meeting, the group will follow up or adjust accordingly</td>
</tr>
<tr>
<td>$2 + 2 = 3$ is acceptable</td>
<td>$2 + 2 = 5$ is expected</td>
</tr>
<tr>
<td>An “I” attitude</td>
<td>A “We” attitude</td>
</tr>
</tbody>
</table>

Table 4.1 Team spirit

**Challenges for group learning**

Write down the challenges that you expect in delivering effective group learning.
4.2.1 The principles of grouping

Learning in groups is an important part of collaborative learning. The lesson design is student-oriented, with the teachers acting as a facilitator. Interactive learning encourages active thinking among students, so that new knowledge is constructed in joint effort. Different grouping methods can be used to meet different learning needs. However, as the focuses vary among different grouping methods, each of them has its own strengths and weaknesses. Therefore, we often rely on teachers’ professional judgment for choosing an appropriate grouping method.

In group learning, teachers should encourage interaction among students, and avoid domination of one or two students; otherwise the purpose of group learning cannot be achieved.

1. Ability grouping
   • Homogeneous grouping
     If students with similar ability levels are put into one group, it is relatively easy to design appropriate teaching methods and materials to suit the needs of the group. However, this approach may create a “labelling” effect, which may demotivate students in lower ability groups. Therefore, teachers should provide appropriate guidance and encouragement to students, such as setting up clear learning objectives by stages and giving comments and suggestions to students in continuous assessment. Homogeneous grouping is quite common in primary schools. Although it received heated criticism in the U.S. during the 1980s to 1990s for perpetuating inequality suffered by minority groups, the opinions towards it have turned to be more positive in recent years.

   Ability grouping will be pointless without corresponding adjustment in curriculum design or teaching activities. Ability grouping can only be effective when coupled with differentiated instructions (VanTassel-Baska, 2004).

   • Heterogeneous grouping
     Mixed-ability grouping is the practice of putting students at different levels into the same group, with an aim to allow students of different abilities to help each other. This
approach can help narrow down the gap among groups. If it is successfully practised, not only would students of higher abilities in a particular domain gain a sense of satisfaction, consolidate their basic knowledge and even inspire a motivation for extended studies, students of lower abilities would also be able to improve their performance. However, if handled improperly, this grouping approach is most likely to create conflicts.

The downside of heterogeneous grouping is the possibility of having students of lower abilities feel inadequate. Therefore, teachers are advised to adopt an appropriate assessment method as a remedy. For example, teachers may consider recording the performance of each group by accumulating marks, where the marks of each student make up the overall marks of the group. The individual marks of a student will be calculated based on the improvement over his/her past performance, so that all of the students will have an equal opportunity to make contribution for their group.

Refer to Student Team-Achievement Division (STAD) in Appendix III for details.

- **Random grouping**
  While random grouping may seem spontaneous, it is not entirely useless because at least it is a fair way of grouping. Random grouping can lead to group diversity (see below). As each group member begins to know each other better, they can also learn and solve problems as a group more effectively.

2. **Group diversity**

   According to recent studies, grouping members of diversified backgrounds can better facilitate innovative problem solving than grouping members of homogenous background (Cheruvelil et al., 2014; Hong & Pages, 2004; Polzer, Milton, & Swarm, 2002). Diversified backgrounds include age, gender, ethnicity, nationality, education background, area of expertise, etc. A mutual understanding among group members is definitely one of the necessary conditions for the effective operation of diversified groups.
According to Polzer, Milton, & Swarm (2002), interpersonal congruence among group members means that the comments of a certain member on other members (such as academic abilities, social skills, creativity, trustworthiness, leadership, diligence and willingness to cooperate) match the self-evaluations of those members. In other words, it means that the self-evaluation of a certain member coincides with the comments of other members on him/her. For example, a member thinks that he/she has a lot of innovative ideas. If other members also agree with it, then this member will often express his/her ideas and receive support from other members.

Therefore, in the early stage of the formation of a group, interpersonal congruence can be achieved by conducting activities that can help members know the characteristics, strengths and weaknesses of each other. Cheruvelil et al. (2014) have suggested some activities, which are valuable reference.

When group members are getting to know each other, they can answer the following questions by turns:

- How would you like to be called?
- What was your favourite toy when you were small? Why did you like it?
- Which is your favourite amusement park or which one do you want to visit the most? Why?
- In which part of this task do you want to participate the most? Why?
- Which part of this task do you think is the most challenging? Why?

### 3. Group maintenance

It usually takes a break-in period to form a successful problem solving team. But how long should the team last? There are no fixed rules on this regard. In school context, except for a task-oriented team, maintaining a group for a semester seems like a feasible arrangement. Teachers may of course make changes based on actual circumstances. Furthermore, they are also encouraged to change the role of each group member if groups are to be maintained (see below).
4.3 Functional roles

Good team operation depends on the different yet complementary roles of the team members. Team structure ranges from simple to sophisticated. Teachers can choose an appropriate structure based on students’ characteristics and learning objectives. Below are two examples.

<table>
<thead>
<tr>
<th>Combinations</th>
<th>Number of members</th>
<th>Functional role</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>4</td>
<td>Chairperson</td>
<td>Leads discussions and makes final decisions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coordinator</td>
<td>Encourages discussions, actively expresses opinions, resolves conflicts, creates a good collaborative environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overseeer</td>
<td>Oversees the progress of the group</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Executor</td>
<td>Responsible for task execution, reports progress to members</td>
</tr>
<tr>
<td>(2)</td>
<td>6</td>
<td>Chairperson</td>
<td>Coordinates the process and facilitates discussions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Examiner</td>
<td>Ensures all members understand the problem solution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Praisers</td>
<td>Encourages all members to participate in collaborations and discussions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Integrator</td>
<td>Integrates background and new knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Verifier</td>
<td>Ensures the group adopts critical thinking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recorder</td>
<td>Records the work of the group</td>
</tr>
</tbody>
</table>

Table 4.2 Role combinations of a group

There are a variety of collaborative learning models. More information can be found in Appendix III.
Teachers may also nurture students’ group regulation skills by designing collaborative problem solving learning activities. Teachers may ask some students to participate as "executors", while others as observers, who observe and record the "execution" process. After the activity, teachers may convene a discussion and reflection session with both groups, exchanging opinions on their performance. Students in the observer group may be able to spot out the issues that the executor group is not aware of. Below are two learning activity designs for teachers’ reference.

**Type 1: Group discussion**

Divide students into groups of six, four of them are to act as executors with the other two as observers. After the activity, the observers are responsible for reporting on students’ performance for improvements in the next group activity.

<table>
<thead>
<tr>
<th>1. Choose a controversial issue</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Executors (a)</strong></td>
<td><strong>Observers (b)</strong></td>
</tr>
<tr>
<td>2a) Students are teamed up according to their stance</td>
<td>2b) Teachers distribute the task instructions to the observers, and explain the nature of their work</td>
</tr>
<tr>
<td>3a) Students share their views with each other in the group of similar stance, strengthening their beliefs on it</td>
<td>3b) Observers get prepared by studying and discussing their work requirements</td>
</tr>
<tr>
<td>4a) Students of different stances are assigned to form a heterogeneous group, and to reach a consensus on the issue</td>
<td>4b) Observers join these heterogeneous groups and pay attention to the executors’ performance in collaboration, communication and problem solving</td>
</tr>
</tbody>
</table>

Table 4.3 Role combination in group discussion

**Type 2: Design activity**

Divide students into groups of six, four of them are to act as executors with the other two as observers. After the activity, the observers are responsible for reporting on students’ performance for improvements in the next group activity.
1. Teachers introduce some tasks on activity design

<table>
<thead>
<tr>
<th>Executors (a)</th>
<th>Observers (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2a) Students study the details of the tasks</strong></td>
<td>2b) Teachers distribute the task instructions to the observers, and explain the nature of their work</td>
</tr>
<tr>
<td><strong>3a) Students form/join groups according to their own interests</strong></td>
<td>3b) Observers study and discuss their work requirements, and get prepared</td>
</tr>
<tr>
<td><strong>4a) Students collaborate and complete the tasks in their group</strong></td>
<td>4b) Observers pay attention to the executors’ performance in collaboration, communication and problem solving</td>
</tr>
</tbody>
</table>

**5. Feedback, discussion and reflection**

Table 4.4 Role combination in design activity

The rationale of the above activities is that, for students to experience the difficulties of collaboration and master the related skills, they need to go through several stages, i.e. establishing initial understanding on an issue (or comprehending partial information), strengthening own beliefs, settling differences and integrating solutions.

**4.3.1 Suggested seating arrangements**

![Suggested seating arrangement for group activities](image)

Figure 4.2 Suggested seating arrangement for group activities (1)
Figure 4.2 Suggested seating arrangement for group activities (2)

Figure 4.2 Suggested seating arrangement for group activities (3)
4.4 Regulation of group process

In collaborative problem solving, regulation of group process may be made on four aspects. The responsibility of regulation may be vested in either in one designated member (e.g. the leader) or all group members.

Teachers may ask students to write down “our task”, “our objectives and plans”, “our strategies” and “our adaptation” at the early stage of group discussion, so that they can conduct self-regulation during the discussion.

Figure 4.3 Regulation of group process

Our task:

Our objectives and plans:

Our strategies:

Our adaptation:
4.5 Communication skills

Communication manners

Problem solving often involves parties other than oneself. For example, when we make requests (e.g. asking our parents for a new mobile phone) or proposals (e.g. a waste reduction project at school), seeking support from other people is the crux of the problem. In such situations, good communication skills are essential.

Good communication skills go beyond polite and friendly exchange of words to speaking in an organised and systematic manner. We often employ communication skills such as making inquiry, explanation and negotiation in the problem solving process. In order to master good communication skills, we need not only knowledge of the correct communication manners, but also opportunities to practice and cultivate good communication habits.

Activity (1)

Telephone calls and messaging

- In the modern society, messaging is more widely used than telephone calls.
- List three differences between the communication skills used in telephone calls and messaging.

1. Due to the absence of tone in communication via messaging, emojis are often used to express emotion.
2. Messaging is concise.
3. Messaging allows participating parties more time for consideration and making a response.
While people are relying more and more heavily on messaging, telephone call still remains an important communication channel. Messaging is popular among friends and families. It can be used in a casual manner, delivering messages with illustrations such as emojis. However, overdependence on illustrations to express ourselves may weaken our ability to communicate properly over the phone. Therefore, it is necessary to reiterate the correct and polite way of telephone communication. The example of Peter below demonstrates some basic etiquettes of telephone communication.

**Figure 4.4 Basic telephone etiquettes**

**Tips for communication:**

✧ Prepare pen and paper for writing down important information before making a call.

✧ If you would like to know who the other person is, you may politely ask “Whom am I speaking to?” or “How may I address you?”.

✧ Pay attention to what the other person says. Wait until he/she has finished before giving your response.

✧ Use mild expressions, especially when sensitive topics are involved.

Which of the above telephone etiquettes can also be applied in interviews?
Do you have good telephone manner?

Do you think you have good manners on the phone? Below is a simple test. Read the items carefully and tick the boxes where appropriate. Calculate your total scores upon completion. How is your performance?

<table>
<thead>
<tr>
<th>Question</th>
<th>Never</th>
<th>Sometimes</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. You give greetings (good morning, good afternoon, hello, etc.).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. You appear to be impatient on the phone.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. You give no response after others have spoken to you.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. You interrupt others while they are talking.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. You address properly people of your senior or people that you know.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. You say goodbye to end a call.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Score calculation**

<table>
<thead>
<tr>
<th>Question 1, 5, 6:</th>
<th>Never</th>
<th>Sometimes</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always = 2 pts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sometimes = 1 pt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never = 0 pt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question 2, 3, 4:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always = 0 pt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sometimes = 1 pt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never = 2 pts</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total: 11-12 pts **Excellent**  
7-10 pts **Good**  
0-6 pts **Poor**

Figure 4.5 Test on communication manners
Role playing

Learning objectives:
1. Apply appropriate telephone etiquettes in phone conversations.
2. Clearly express opinions or requests.
3. Properly respond to others’ questions.
4. Be prepared for different situations in a phone conversation.

We need to think through what we want to say within a limited amount of time when talking on the phone. Therefore, we need to be prepared before making a call. We can first ask ourselves the following three questions:

(1) What is the purpose of this call?
(2) How can I achieve this purpose?
(3) What obstacles may I encounter? How can I deal with them?

Exercise

Peter has joined a painting competition. The organiser required all contestants to have their works delivered to the UK before 10 June 2016 for assessment. Since it would take the post office 2 to 6 days to deliver his post to the UK, Peter mailed his work on 3 June. However, he realised at the same night that he has mistakenly put in the wrong address. His work would probably not be able to arrive before the deadline if it was to be returned and redirected to the organiser from the wrong location. If you were Peter, how would you solve this problem?

1. In the above case involving an incorrect mailing address, in addition to enquiring the organiser, Peter would also need to ask the post office for assistance.

Help Peter prepare for his call based on the three guiding questions above.
2. Based on the above demonstration, perform a role play by applying appropriate telephone etiquettes. If you were Peter, how would you seek assistance from the post office on the phone? Play out the roles in groups of two.

3. During the telephone conversation, how should Peter respond to the organiser if he is asked to provide evidence to substantiate his explanation?
**Mindset of communication:**
- Polite
- Clear
- Convincing

**Peter’s problem**

**Mindset of problem solving:**
(1) What is the purpose of Peter’s call?
(2) How can Peter achieve this purpose?
(3) What obstacles may Peter encounter? How can he deal with them?

---

**Self-monitoring centre**

1. Have I made adequate preparation before making the call?
2. Have I expressed my opinions or requests clearly?
3. Have I anticipated and prepared for different possible responses from the other side?

---

Figure 4.7 Problem solving with communication skills
Role playing

1. One day, you saw that a store was having a “major sale” and the watch which your good friend had always wanted was down to $300. You decided to buy the watch as a gift to your friend as a surprise. The salesperson reminded you that “no refund or exchange for discount items” as you made the payment. When you arrived at school the next day, your friend happily told you that he had bought himself the watch he liked yesterday. So you had no other choice but to ask if someone else wanted the watch and unfortunately no one was interested. Therefore, you planned on going back to the store for a refund or exchange for other items. While the store might not necessarily allow this, you still wanted to try.

2. Form groups of two, with one playing the role of the salesperson and the other “you”. How would you convince the salesperson?
2. Below is the conversation between Joanna and the salesperson. In your opinion, is her way of communication a good one? Is her problem solving method effective?

Joanna: I bought this watch yesterday as a gift to one of my friends but he has already bought it himself. So, I would like to return it.
Salesperson: Sorry, we have a no-return policy on discount items.
Joanna: Then can I exchange it for another model?
Salesperson: I’m sorry, madam, we offer no return or exchange on discount items.
Joanna: What if I sell it to you in private, just give me $300. I have never worn it.
Salesperson: Madam, we are not allowed to do this. We only sell watches. If I buy this watch back from you, people would be worried that we sell second-hand products. We only sell brand new watches. No second-hand items.
Joanna: Then I would be willing to lower the price to $250 for you. I can’t do any lower.
(The salesperson didn’t respond.)
Joanna: It would only be between you and me, or maybe you could see if anyone else working here likes this model. I could lower my price.
Salesperson: Madam, it doesn’t concern me whatever price you set. May I suggest you selling it somewhere else? We cannot help you here. I’m sorry.
Joanna: I’d lose a lot of money if I go to another place.
Salesperson: Madam, is there anything else I may help? Or I really need to attend to other customers.
Joanna: Well, thanks, I will try to figure something out.

✧ Discuss the communication skills used in the above conversation, and how to make improvements.
4.6 Communication skills in group collaboration

All of the communication skills discussed above are used in communication with outsiders who are not part of one’s own team or group. These communications are aimed at soliciting support to requests. However, in the situation of collaborative problem solving, we often find ourselves communicating with fellow group members and thus the communication objectives and skills are different.

Activity (3)

Try to choose the most appropriate response for the following conversation and explain your choice.

1. A: I think we need to pick the location first before planning the activities for the autumn picnic.
   B: ____________________________

- a. It’s simple logic to confirm the activities first and then choose a suitable location. You have no experience at all.
- b. While it is a valid suggestion, I think it will also work if we confirm the activities before choosing a suitable location.
- c. Who is responsible for the resource and materials?

In collaborative problem solving process, good communication helps to achieve objectives in the following areas:

<table>
<thead>
<tr>
<th>1. Establishing team spirit, including</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. mutual understanding on each other’s backgrounds, characteristics, strengths, weaknesses, etc.</td>
</tr>
<tr>
<td>B. establishing mutual trust</td>
</tr>
</tbody>
</table>

119
2. Reaching a shared understanding on the problem, including
   A. its background (may involve exchange of information)
   B. the solution and procedures in solving the problem

3. Regulating the problem solving process
   A. reminding each other to ensure successful execution of the plan and flexibility
      when dealing with unexpected issues
   B. encouraging and supporting each other to maintain team morale

Below is a case study of collaborative problem solving. Which of the conversations can be recognized as good communication?

**Discussion on activity arrangements in group chat**
*(Adapted from released sample questions of PISA 2015)*

Starting from next week, some international exchange students will come to your school and stay for a month. The school plans to arrange your class to take part in a sightseeing activity with the exchange students. Your teacher, Mr. Wong, has appointed Rebecca, Vincent and you to be responsible for choosing one among the four sightseeing locations, i.e. Hong Kong Science Museum, walled-villages in the New Territories, the Hong Kong Wetland Park and Cheung Chau. You decide to discuss this online or via group chat on WhatsApp tonight, with a view to giving Mr. Wong an early answer.

Below is the WhatsApp group chat record among Rebecca, Vincent and you. Choose the best option for each of the dialogues.
Discussion Group – Sightseeing Location
Rebecca, Vincent and you

Vincent
Hey, guys, where should we start?

Rebecca
I think we should take them to a place full of Hong Kong characteristics.

Vincent
Then maybe the walled-villages in the New Territories, the Hong Kong Wetland Park and Cheung Chau are more iconic. Let’s look up for some information.

Vincent
Hey, guys, where should we start?

Rebecca
I think we should take them to a place full of Hong Kong characteristics.

Vincent
Then maybe the walled-villages in the New Territories, the Hong Kong Wetland Park and Cheung Chau are more iconic. Let’s look up for some information.
Discussion Group – Sightseeing Location
Rebecca, Vincent and you

Rebecca

Mr. Wong said that the school bus will pick us up at school at 10:00 a.m. on Tuesday, and then drop us off at school before 3:00 p.m.

Vincent

I seem to remember that the Wetland Park is closed either on Monday or Tuesday, but I’m not sure.

Rebecca

Yes... The website says it is closed on Tuesdays.

a. Then let's see if all the three places are open during this period of time.
b. Good, no one wants to stay at school after class.
c. Some of the students have extracurricular activities after 3:00 p.m.
d. Does this mean we will have less homework?

Vincent

a. Then we can’t go to the Wetland Park.
b. How stupid? How can a park be closed?
c. I am checking on its website.
d. So, we only have two options left?

Rebecca

a. Why don't you mention it earlier?
b. Then let's pick between the walled-villages in the New Territories and Cheung Chau.
c. What a waste of time... Let's just randomly pick one.
d. I know it was going to be like this.
Discussion Group – Sightseeing Location
Rebecca, Vincent and you

Vincent
Personally, I like Cheung Chau better so I’m going with Cheung Chau.

a. Just because you like it doesn’t mean others do.
b. Cheung Chau is so far away…
c. Cheung Chau is a valid choice, but it’s a little far away, which will shorten the time we have for sightseeing.
d. Whatever.

Rebecca
I agree on that. Cheung Chau is bit too far. Besides, I seem to remember that some of our classmates get seasick. I think the walled-villages in the New Territories will be more suitable.

a. So, what’s our decision?
b. Haha, Vincent, my suggestion beats yours.
c. So Rebecca and I both think the walled-villages in the New Territories are more suitable. What do you think, Vincent?
d. We should have picked the walled-villages in the New Territories at the beginning. What a waste of time.

Vincent
What you have said does make sense to me. Let’s tell Mr. Wong we want to go to the walled-villages in the New Territories.

a. Alright, to summarise, the walled-villages in New Territories are the most suitable choice among the four options because the place carries Hong Kong characteristics, which will help our classmates understand the local culture efficiently. And it is open on Tuesdays and is not too far away.
b. I always make a valid point.
c. Do whatever you want.
d. Ok, I have to go now.
Teachers may create similar exercise materials for students. During the learning process, consider asking students to discuss why some of the answers are not appropriate. Is it because of improper manners, or the failure to relate to the topic, or because they cannot facilitate group discussion or relationship? Teachers may also guide students to comment on how “Rebecca, Vincent and you” reached an agreement on the solution.
**Positive conversations**

During group discussion, we can facilitate collaboration by responding to group members in a positive manner. On the contrary, not only will negative words damage the interpersonal relationship among group members, they will also affect the group’s problem solving effectiveness.

In the table below are some examples of positive and negative responses that may appear when we are “establishing team”, “seeking common ground” and “discussing and executing solutions”. Teachers can ask students to discuss them first and then ask them to fill more examples in the table.

<table>
<thead>
<tr>
<th>Establishing team</th>
<th>Negative responses</th>
<th>Positive responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Cherishing team collaboration, inspiring members to work together towards the common goal</td>
<td>● Having a meeting is so much work! Why don’t we just divide all the tasks and have everyone finished their own parts!</td>
<td>● “Working as a team is always better than working alone. Team spirit rocks!” (For encouraging members)</td>
</tr>
<tr>
<td>● Being able to respect and support each other despite facing adversities and difficult people</td>
<td>● Do you know that everyone here hates you?</td>
<td>● I’m not good at XX, I think it would be better if I do XXX. Any room for adjustment? (For mutual complementary)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● How can we see the current difficulties in a positive light? (For establishing a common understanding)</td>
</tr>
</tbody>
</table>
Things to consider when pointing out the shortcomings of difficult people:

- Is it really necessary to point them out?
- Timing. Consider doing so at a time when everyone is at a peaceful state.
- Reflect on oneself before guiding others to do the same. Example: I think I could have done better on XXX. How would you evaluate your own performance? (Be modest and frank)

<table>
<thead>
<tr>
<th>Seeking common ground</th>
<th>Negative responses</th>
<th>Positive responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Seeking common ground through collaboration, creating a collaborative</td>
<td>• Why does the minority have to follow the majority?! I absolutely disagree!</td>
<td>• Solution A and Solution B each has its own strengths. Is it possible to combine them?</td>
</tr>
</tbody>
</table>
Taking the initiative to introduce new concepts, with a view to creating new space for the team to reach a common ground.

- I don’t want to take any risk! Just do what others have done in the past!

I have a new idea that I want to get everyone’s opinion!

- We all agree on... and we don’t agree on... Let’s think about how to further settle our differences?

(Integration of strengths)

Everyone here is welcome to evaluate each solution from his/her own areas of expertise. (For a holistic consideration)

- We all agree on... and we don’t agree on... Let’s think about how to further settle our differences?
<table>
<thead>
<tr>
<th>Discussing and executing solutions</th>
<th>Negative responses</th>
<th>Positive responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Selecting strategies to solve the problem and preparing backup plans</td>
<td>- (What if it rains?) Don’t get yourself worried over nothing. There’s no need for any backup plan!</td>
<td>- Having taken everything into account, which strategy should we choose? What kinds of uncertainties should we expect when preparing backup plans? (Prepare for a rainy day)</td>
</tr>
<tr>
<td>- Monitoring and evaluating individual and group efficiencies</td>
<td>- You still haven’t finished? You are slowing the whole team down!</td>
<td></td>
</tr>
<tr>
<td>- Taking the initiative to make suggestions or adjust plans or duties according to circumstances</td>
<td>- Changes in the environment are beyond my control! I can’t help!</td>
<td>- Now that the situation has changed, do we need to change our strategy? Having searched for relevant information, I think XXX is a feasible plan</td>
</tr>
</tbody>
</table>

128
because XXX. What do you all think? (Sufficient preparation)

- Are those who have completed their tasks willing to assist others in catching up on the overall progress? (Flexible adjustment)

- In the execution of the solution, I discover that some of the works are more difficult than expected, for example XXX. May I suggest assigning greater manpower to these areas to enable a smoother operation? What do you all think? (Regular review)

Table 4.5 Group communication skills
Communication game: Charades

1. Divide the students in the class into five groups and play the game by turns.

2. Each group appoints a member as the “spokesperson” and another as the “overseer”, with the remaining members acting as “players”. The “spokesperson” stands facing the blackboard and all the other members facing away.

3. As the game begins, the teacher shows the word written on the puzzle card to the “spokesperson”. He/She can use verbal hints to help other group members guess the correct answer as fast as possible. The group can gain one point when any of the “players” gets the correct answer. Either the “spokesperson” or the “players” may choose to “pass” and skip to the next question. Each round is five minutes.

4. When acting out the answer,
   A. the “spokesperson” cannot utter the actual word, or any word with the same or similar pronunciation.
   B. the “spokesperson” cannot read out any key word in other languages. For example, if the key word is “train” in Chinese, then the English word “train” cannot be used.
   C. the “spokesperson” cannot mouth the word.
   D. the “overseer” is responsible for ensuring that the game is played in accordance with the rules.

5. The next group will play the game after five minutes.

6. The group with the highest points at the end wins.

* If time permits, consider counting the points after multiple rounds, and different students should be appointed to play as the “spokesperson” at each round.
Communication game: Building blocks

Form groups of four to assemble the blocks together according to a drawing. Each member is assigned with a role with specific responsibilities.

Conductor: Only the conductor is allowed to look at the drawing. He/She is responsible for giving instructions to the group members. He/She is only allowed to use words but not to help build the blocks.

Supplier: Only the supplier is allowed to take additional blocks from the deposit. The conductor has to tell him/her which blocks are needed for each step.

Builder: Only the builder is allowed to build the blocks. The conductor has to tell him/her how to build the model depicted in the drawing.

Overseer: The overseer is responsible for ensuring that the game is played in accordance with the rules and timing the game.

The first group to submit the finished work to the teacher wins.

Example:

The conductor tells the supplier: “Pass one red and one yellow block to the builder.”
The conductor tells the builder: “Put the red block on top of the yellow one.”
Self-evaluation plays an important role in collaborative learning. Teachers often have to pay attention to the whole class and therefore may not be able to focus on evaluating the students of a certain group. As a result, it is necessary for students to self-evaluate their group process, e.g., whether or not their group collaboration process is smooth and what improvements can be made. Teachers can give a summative evaluation at the end of an activity.

The “guidelines on teacher’s evaluation” helps teachers evaluate students’ skills in problem solving, communication and collaboration. Some standards are provided with respect to each of those skills. Competency levels are categorised into three stages, namely, the beginning, developing and mastering stage. Teachers can determine the learning stages and areas for improvement according to the descriptors set out in the evaluation form.

Evaluations are further divided into “self-evaluation” and “group evaluation”. Both of them are formative assessment. Self and peer evaluations can also serve as self-regulation tools for students, helping them to examine and improve their performance during the collaboration process. The design of the “guidelines on self-evaluation” and “guidelines on group evaluation” are simple and clear for the use of junior secondary students. Teachers can ask students to read the evaluation items carefully in advance, use them for self-monitoring during the collaboration process, or report whether they have met the requirements of the guidelines at the end of the activity.
Guidelines on self-evaluation

In the group activity, students may use "self-evaluation" to monitor their own performance and make self-regulation to enhance the effectiveness of learning.

Teachers may use a three-level evaluation scheme: No, Normal and Excellent, according to circumstances

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Did I take part in the group activity?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Did I understand the content of the activity?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Did I understand my role?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Did I perform my role properly?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Did I take the initiative to provide constructive feedback?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Did I complete the assigned tasks?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Did I contribute to creating a harmonious atmosphere within the team?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Did I encourage my team members and inspire them to work together for the goals?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Did I monitor the progress and effectiveness of the team?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What I can improve:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.6 Guidelines on self-evaluation

Guidelines on group evaluation

Teachers may also ask students to reflect on their performance after the group activity and to identify areas for improvement.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. We completed the tasks within the time allowed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. We had a division of work.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. We assigned tasks according to members' abilities.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. We listened to different views of members.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. We encouraged and helped each other.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. The atmosphere within our team was harmonious.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. We respected each other and handled disagreement in a friendly manner.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What we can improve:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.7 Guidelines on group evaluation
Descriptors for providing teacher feedback

The descriptors below are arranged in three domains, namely, problem solving skills, communication skills and collaboration skills. There are three stages for each domain; beginning stage, developing stage and mastering stage. Teachers may give ticks in the appropriate boxes to provide feedback to students. Teachers may enrich the content based on their students’ needs.

<table>
<thead>
<tr>
<th>Beginning</th>
<th>Developing</th>
<th>Mastering</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problem Solving</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ propose solutions or strategies to solve a problem</td>
<td>□ select a problem solving strategy and develop an action plan</td>
<td>□ select a problem solving strategy and prepare alternative plans</td>
</tr>
<tr>
<td>□ complete the task assigned to one’s role in the team</td>
<td>□ execute actions that comply with the planned distribution of roles and make adjustments when necessary</td>
<td>□ monitor and evaluate individual and team effectiveness</td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ express oneself to team members in a disorganized manner (eg. I think we need to consider the cost...I mean...as it is quite costly...the raw materials are costly, the second one is better.)</td>
<td>□ express oneself to team members in an organized manner (eg. I think the second one is better because their raw materials are cheaper and the cost is lower.)</td>
<td>□ express oneself to team members in an organized and affirmative manner (eg. I think the second one is better because their raw materials are cheaper and the cost is lower. We may refer to the data...)</td>
</tr>
<tr>
<td>□ show courage in sharing new or unconventional ideas</td>
<td>□ ask meaningful questions that clarify the vision, goals and viewpoints for better solutions</td>
<td>□ take the initiative in introducing new resources and exploring further ideas to facilitate the team to progress further</td>
</tr>
<tr>
<td>□ comprehend messages with an open mind and ask questions to identify</td>
<td>□ respond specifically to queries raised during the problem solving process</td>
<td>□ negotiate for consensus</td>
</tr>
<tr>
<td></td>
<td>□ enhance mutual understanding through effective means and with a</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the problem and team goals</td>
<td>respectful attitude</td>
<td>and foster a cooperative atmosphere to resolve conflicts</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------</td>
<td>----------------------------------------------------------------</td>
</tr>
<tr>
<td>Collaboration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ be ready to act</td>
<td>☐ share the other team members’ perspectives on the problem and establish a common understanding of the talents and potential of members</td>
<td>☐ treasure working as a team and take initiative to foster synergy for attaining the team goals</td>
</tr>
<tr>
<td>responsively and reach the goals with team members</td>
<td>☐ identify and capitalise on the talents and potential of members</td>
<td>☐ show mutual respect and support when dealing with difficult people and situations</td>
</tr>
<tr>
<td>☐ follow the rules and instructions set for the team work</td>
<td>☐ be able to work with different people and accept the adjustments to plans or roles in changing situations</td>
<td>☐ take initiative to propose plans or make adjustments to the plans and roles in changing situations</td>
</tr>
<tr>
<td>☐ participate actively in the team and contribute to achievement of the team goals</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 4.8 Descriptors for teacher evaluation**

Comments:

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
Background information:

Thanks to advances in modern medicine, some patients suffering from organ failures can now prolong their lives through organ transplantation. In fact, organ transplantation has become the only hope for many patients and their families. Despite a growing awareness and acceptance in society, the ratio of Hong Kong residents willing to donate their organs after death still remains relatively small in comparison to many Western countries. Recent statistics shows that only 5.4 Hong Kong residents in every million are willing to donate organs after death. As only a small percentage of donors will match the conditions of the patients, the society is in need of more organ donors.

Up to 2016, more than 2,000 patients in Hong Kong who need organ donation are anxiously waiting for their miracles every day. The Department of Health calls to the public for more organ donors to help the patients in despair.

Task:

Work in groups of four. Apply collaborative problem solving skills to design an activity that promotes organ donation to the public, with an aim to increase the number of people willing to donate organs.
**Related topics:** The formation and application of values; enhancing humanistic qualities
(This lesson plan is designed to show how to develop students’ collaborative problem solving skills based on the related topics. It is not a complete lesson plan for the related topics.)

**Topic:** Organ donation

**Grade:** Secondary 1 to Secondary 3

**Duration:** 80 minutes

**Learning objectives:**

**Knowledge (K):**

1. To comprehend information about organ donation in Hong Kong
2. Figure out the solutions to mitigate against a lack of organ donations in Hong Kong

**Skills (S):**

1. Work together with group members to mitigate against a lack of organ donations in Hong Kong by applying collaborative problem solving skills
2. Learn how to discuss with group members with appropriate communication methods

**Attitudes and values (A):**

1. Respect different opinions
2. Value the contributions made by each and every group member
3. Work with group members to enhance team spirit and complement each other.
<table>
<thead>
<tr>
<th>Session</th>
<th>Duration</th>
<th>Teaching activities</th>
<th>Learning objectives</th>
<th>Relevant materials</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 min.</td>
<td>(Classwide) Teachers explain the background information about organ donation.</td>
<td>K1</td>
<td></td>
<td>Students may immediately apply System 1 thinking (stating reasons or solutions based on one’s intuitions), such as “force people to donate”, “make more promotion”. It is necessary for teachers to guide students to apply System 2 thinking (breaking down the issues step-by-step to find feasible solutions).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Teachers may invite students:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>✷ to raise their hands if they have heard about organ donation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>✷ to raise their hands if they support organ donation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>✷ to raise their hands if they are willing to become organ donors in future</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(For classrooms equipped with voting machines / Apps, consider conducting a small public opinion survey by such devices)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10 min.</td>
<td>Play a video about organ donation in Hong Kong.</td>
<td>K1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Classwide) Teachers guide students to think about the content of the video. Teachers may ask the following questions: ◇ What issue was mentioned in the video? ◇ Do you know anyone who is waiting for an organ transplant? ◇ Guess which countries have a relatively larger ratio of organ donors? ◇ In your opinion, why is there a smaller ratio of organ donors in Hong Kong comparing with those countries? ◇ After watching the video, do you think that you have fully understood the information about organ donation in Hong Kong? Is there any part that needs additional information or clarification?</td>
<td>K1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 3 | 30 min. | **Group activity (1):**  
Background information: Despite the enhanced promotion and education on organ donation by the government in recent years, as well as the increase in social awareness, there is no significant improvement in the number of registered organ donors, the number of donated organs yet decreased. Try to find out the reasons and propose a solution.  
Task: Work in groups of four. Plan how to promote organ donation to increase the number of donors with your group members by applying collaborative problem solving skills.  
<Teachers may also arrange the following challenge based on students’ learning stages>  
Despite the recent increase in the number of registered organ donors, the number of donated organs yet decreased. Try to find out the reasons and propose a solution. | K2, S1-2, A1-3 | Guidelines on individual evaluation, group evaluation and teacher’s evaluation |
|---|---|---|---|---|
| 1. Teachers divide students into groups of four.  
Mixed-ability grouping is recommended. Teachers may choose other modes based on actual needs.  
2. After the grouping, teachers assign each student with a role in his/her group. (Such as: leader, recorder, | | ➢ For students with higher abilities, teachers may ask students to analyse the reasons and figure out the solutions after categorising the donors. There is no need to give them excessive intervention.  
➢ During group discussion, teachers should pay close attention to the process of the groups. Offer guidance or make adjustments as appropriate.  
➢ Teachers can praise those groups doing well in certain aspects, as a way to inspire other groups for |
3. (Classwide) Teachers use an analysis matrix to categorise organ donors.

4. (In groups) Each group has to identify the reasons why people of different categories are willing or unwilling to donate organs. Following group discussion, the reporter of each group is responsible for explaining their group answer to the whole class.

* Teachers may ask students to conduct “self-evaluation” during group learning. At the same time, teachers are also advised to assess students’ performance in accordance with the “guidelines on teacher’s evaluation”.

5. (Classwide) Teachers use tables to summarise all potential reasons given by students, and guide them to evaluate the prevalence of each reason.

6. (In groups) Each group is responsible for coming up with solutions for one of the listed reasons. Following group discussion, the groups have to report on their findings by turns.

7. (Classwide) Teachers summarise and fill all solutions listed by students in the relevant tables, and discuss the strengths and weaknesses of the solutions.

8. (Classwide) Students analyse the strengths and weaknesses of all solutions using the value matrix, self-improvement.

- During group discussion, remind students to apply good communication skills.

- In addition to allowing students to monitor their group performance by themselves, individual and group evaluations allow teachers to know what he/she has to follow up.
and then pick the most appropriate solution(s) by vote.

9. After the real-life situation learning, students can conduct group evaluation to reflect on their performance.

Teachers may ask the following questions:
- How would you categorise organ donors?
- Do you think it is possible to compare the need for organ donation in Hong Kong with elsewhere directly through the number of donors?
- What factors do you think are stopping ordinary people from becoming organ donors?
- How do you think this issue can be resolved?
- Generally speaking, do you think the group activity was successful?
- Did you encounter any difficulty during the group activity?
- What improvements do you think could be made to improve the group performance?
1. Teachers divide students into groups of four. Mixed-ability grouping is recommended. Teachers may choose other modes based on actual needs.

2. After the grouping, ask students to assign duties themselves and inform the teacher about the tasks assigned to each role.

3. (In groups) Each group designs one promotional poster on organ donation. Students complete and submit their works to the teacher in the next lesson.

   * Teachers may ask students to conduct “self-evaluation” during group learning. At the same time, teachers are also advised to assess students’ performance in accordance with the “guidelines on teacher’s evaluation”.

   * After the activity, students can conduct group evaluation to reflect on the collaboration process.

<table>
<thead>
<tr>
<th>4</th>
<th>20 min.</th>
<th>Group activity (2): Task: Work in groups of four. Design a promotional poster on organ donation with your group members to arouse public awareness.</th>
<th>K2, S2, A1-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>5 min.</td>
<td>(Classwide) Summary and review</td>
<td>A1-3</td>
</tr>
</tbody>
</table>

- During group discussion, teachers should pay close attention to the process of the groups, offer guidance or make adjustments as appropriate.
- During group discussion, remind students to apply communication skills.
Problem solving process for group activity (1):

Background information: Despite the enhanced promotion and education on organ donation by the government in recent years, as well as the increase in social awareness, there is no significant improvement on the overall condition of organ donation. There is even a decreasing trend.

Task: Work in groups of four, plan how to promote organ donation to increase the number of donors with your group members by applying collaborative problem solving skills.

<Step 1: Identify / define the problem>
The reluctance to donate organs among the public has led to a big gap between the demand and supply of organ donations.

<Step 2: Analyse possible causes>
First break down the problem into different categories, which can help identify the causes in a systematic manner.

Based on the information collected, identify different causes of the problem:

<table>
<thead>
<tr>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowing nothing about organ donation</td>
<td></td>
</tr>
<tr>
<td>The public understands little about organ donation due to a lack of life education in the past.</td>
<td></td>
</tr>
<tr>
<td>2. Organ donation goes against one’s cultural</td>
<td></td>
</tr>
</tbody>
</table>
| Background information: Despite the enhanced promotion and education on organ donation by the government in recent years, as well as the increase in social awareness, there is no significant improvement on the overall condition of organ donation. There is even a decreasing trend.

Task: Work in groups of four, plan how to promote organ donation to increase the number of donors with your group members by applying collaborative problem solving skills.

<Step 1: Identify / define the problem>
The reluctance to donate organs among the public has led to a big gap between the demand and supply of organ donations.

<Step 2: Analyse possible causes>
First break down the problem into different categories, which can help identify the causes in a systematic manner.

Based on the information collected, identify different causes of the problem:

<table>
<thead>
<tr>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowing nothing about organ donation</td>
<td></td>
</tr>
<tr>
<td>The public understands little about organ donation due to a lack of life education in the past.</td>
<td></td>
</tr>
<tr>
<td>2. Organ donation goes against one’s cultural</td>
<td></td>
</tr>
</tbody>
</table>
Leaving someone’s body incomplete after death is a major taboo in Chinese culture and tradition.

3. Misunderstandings or doubts about organ donation:
   - some people are worried that once they register as organ donors, medical staff will not resuscitate them in case of accidents.
   - some people are worried that after registering as organ donors, medical staff will be free to remove any organ after their deaths.
   - some people are worried that their family members will have to bear the expenses arisen from organ donation.

4. Psychological obstacles:
   It is quite a psychological barrier to overcome to donate one’s own organs to other people, especially to strangers.

5. Dissent by family members
   Some people are worried that their family members will not be able to handle their will to donate organs after death.

<Step 3: Develop alternative solutions>

<table>
<thead>
<tr>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowing nothing about organ donation  &lt;br&gt;The public understands little about organ donation due to a lack of life education in the past.</td>
<td>Enhancing promotion and education  Method 1: setting up official webpage  Method 2: promotion through commercials  Method 3: education at schools</td>
</tr>
<tr>
<td>2. Organ donation goes against one’s cultural background  &lt;br&gt;Leaving someone’s body incomplete after death is a major taboo in Chinese culture and tradition.</td>
<td>Introducing how human bodies are handled in a humanitarian way following organ donation.</td>
</tr>
</tbody>
</table>
3. Misunderstandings or doubts about organ donation

- some people are worried that once they register as organ donors, medical staff will not resuscitate them in cases of accidents.
- some people are worried that after registering as organ donors, medical staff will be free to remove any organ after their deaths.
- some people are worried that their family members will have to bear the expenses arisen from organ donation.

<table>
<thead>
<tr>
<th>Clarifying misunderstandings or doubts that the public has about organ donation via public channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method 1: clarifying misunderstandings and doubts on the official webpage</td>
</tr>
<tr>
<td>Method 2: clarifying misunderstandings and doubts via news media</td>
</tr>
<tr>
<td>Method 3: clarifying misunderstandings and doubts via other promotional channels (commercials, pamphlets)</td>
</tr>
</tbody>
</table>

4. Psychological obstacles

It is quite a psychological barrier to overcome to donate one’s own organs to other people, especially for total strangers.

<table>
<thead>
<tr>
<th>Educating the public about patients’ sufferings and their urgent needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method 1: Raising social attention through news about patients passing away due to the failure to obtain suitable organs</td>
</tr>
<tr>
<td>Method 2: Reflecting the pressing need for organ donation by interviewing experts, patients and their families</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Educating the public about the value of organ donation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method 1: Letting the public know that organ donation can help bring hope to other people by interviewing patients who have had successful organ transplants, as well as their families</td>
</tr>
<tr>
<td>Method 2: Making short films of patients’ stories to raise public attention</td>
</tr>
</tbody>
</table>

5. Dissent by family members

Some people are worried that their

<table>
<thead>
<tr>
<th>Enhancing social education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method 1: increasing the public’s exposure to</td>
</tr>
<tr>
<td>family members will not be able to handle their will to donate organs after death.</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td><strong>Educating on how to express one’s will to family members</strong></td>
</tr>
<tr>
<td>Method 1: using various promotional channels to educate the people who have the donation intention on how to express their will to their family members</td>
</tr>
</tbody>
</table>

**<Step 4: Evaluate each solution>**

Based on the solutions proposed above, discuss which of the measures have already been adopted. What improvements are needed? Is there any other creative solution?
Chapter 5
Collaborative Problem Solving Skills (II)
Values and Attitudes

Chapter focuses
① Understanding the benefits of collaboration
② Positive values and attitudes for collaborative problem solving
③ Points to note for the collaboration on electronic communication platforms
④ Points to note for the collaboration with people of different cultural backgrounds
⑤ Collaborating with difficult people and handling conflicts effectively
Suggested teaching activity combinations:

<table>
<thead>
<tr>
<th>Combination (to be selected according to student needs)</th>
<th>Content</th>
<th>Time</th>
<th>Relevant teaching materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Understanding the benefits of collaboration and the appropriate attitudes</td>
<td>10 min</td>
<td>P. 150-152</td>
</tr>
<tr>
<td></td>
<td>Activity 1, 2</td>
<td>30 min</td>
<td>P. 150-151</td>
</tr>
<tr>
<td>2</td>
<td>Understanding the benefits of collaboration and the appropriate attitudes</td>
<td>10 min</td>
<td>P. 150-152</td>
</tr>
<tr>
<td></td>
<td>Points to note for the collaboration on electronic communication platforms</td>
<td>10 min</td>
<td>P. 153-154</td>
</tr>
<tr>
<td></td>
<td>Activity 3</td>
<td>20 min</td>
<td>P. 155</td>
</tr>
<tr>
<td>3</td>
<td>Points to note for the collaboration with people of different cultural backgrounds</td>
<td>40 min</td>
<td>P. 156-160</td>
</tr>
<tr>
<td>4</td>
<td>Collaborating with difficult people</td>
<td>10 min</td>
<td>P. 161-162</td>
</tr>
<tr>
<td></td>
<td>Handling conflicts effectively</td>
<td>10 min</td>
<td>P. 164-165</td>
</tr>
<tr>
<td></td>
<td>Activity 4/5</td>
<td>20 min</td>
<td>P. 163 ; 165</td>
</tr>
</tbody>
</table>
5.1 The benefits of collaboration

- Learning from one another and making progress together
- Enriching thinking dimensions, learning to think from different perspectives
- Group members complementing each other and putting their strengths in synergy
- Integrating the opinions of each member, increasing the level of participation and acceptance for a solution
- An environment of mutual appreciation and encouragement helps foster creativity

Activity (1)

Work in groups of five. Each group works together to write the word “hamburger” on a piece of paper. Each group will be given a pen, a few ropes, a scotch tape and a pair of scissors. One end of the ropes will be tied with the pen, while the other ends will be controlled by students. Each group appoints one student to give instructions and the remaining four will have their eyes covered.

The first group to finish wins.
Each group makes some paper tubes and then forms them together into a conveyor belt for delivering ten balls (table tennis balls / tennis balls) from one side to a bucket three metres away. As the conveyor belt may not be long enough, students need to take turns extending it. If any of the balls drops to the ground in the middle, the group has to start over again from the beginning. Work in groups of seven, with six students making the conveyor belt and the other one putting the balls onto the belt at the starting point.

The first group to finish wins.

5.2 Appropriate attitudes
Ask students: What lessons on collaborative problem solving have they learnt from the activities?

✧ Respecting different opinions
✧ Cooperating by division of work and valuing the contribution of each group member
✧ Group cohesion: learning to work as a team and complement each other instead of trying to switch groups when encountering difficulties
✧ Encouraging each other and settling disputes
✧ Willing to make necessary compromises to achieve common goals
✧ Respecting and accepting different cultures
✧ Not giving up easily when confronted by difficulties
✧ Allowing others to participate is beneficial to ourselves and others (especially for outstanding students in the groups, teachers are advised to encourage them to leave other students some opportunities)


**Discussion Zone**

1. Do you prefer creating something alone or in teams?
2. Which is more likely to inspire your creativity, an environment of appreciation or criticism?
3. Which of the following factor(s) do you think has/have contributed to the rapid development of the creative industries in South Korea:
   - South Koreans are born to be more creative than Hong Kong people
   - South Korea enjoys a better education system
   - The South Korean government implements policies beneficial to the development of creative industries
   - The creative industries in South Korea are large in size
     - South Koreans are an audience that appreciates creativity
4. Being part of the audience yourself, how will you support the local creative industries?
   - By respecting intellectual property rights
5. The formation of a successful creative team requires:
   - Similar characteristics VS Complementary characteristics
   - Similar knowledge VS Complementary knowledge

**Summary**

Students are expected to realise through discussion that creativity requires good interpersonal environments, including those within (e.g. a harmonious relationship, complementary dispositions and knowledge, etc.) and outside a group (e.g. the value attached to creativity, audiences that accept different views, etc.).
5.3 Collaboration on electronic communication platforms

In addition to face-to-face interaction, we often use electronic communication platforms to collaborate with others. Have you ever tried to collaborate with others via online platforms or group chat? Have you encountered any obstacle during the process?

Teachers may ask students to share their experiences on online collaboration (project learning, activity planning, video games, etc.).

“Why didn’t he reply me? My message has been marked with two blue ticks. Is he angry with me?”

“She said ‘Whatever’ – is she reluctant to agree with me?”

Do they sound familiar to you?

For face-to-face communication, much information is delivered using tones, gestures and facial expressions in addition to words. However, we are not able to identify the tones, gestures and facial expressions of the people with whom we are communicating online or through other electronic communication platforms. We can therefore only rely on their responses on such platforms to guess what their attitudes may be. Such circumstances will easily give rise to misunderstandings.

As a result, we need to pay attention to the following three aspects when collaborating with others through electronic communication platforms:

**Time difference**

Collaboration through electronic communication platforms is different from face-to-face interaction. The other person may not necessarily be able to see and respond to
your messages right away. In the two scenarios above, while your phone or computer may tell you that the other person has received your messages, he/she may indeed be handling something else and cannot reply right away. Or the other person may want to think thoroughly before giving a reply. Therefore, we need to understand that there are a number of possibilities when someone does not immediately reply to us in the communication via electronic communication platforms.

Remember to think about the time zone of the other person when requesting a video conference.

Further clarification

We are not able to deliver messages with body languages in conversations through electronic communication platforms. Therefore, further clarification is needed to help others understand our views and stances. Or we may also express the considerations behind our views, and use punctuation and emojis to express ourselves when appropriate.

Cultural difference

Globalization has increased the opportunity for us to communicate with people from different countries and cultures. In communication and collaboration with different people, we should be sensitive about their cultural, religious and political views so as to avoid making unintentional offence. Apart from learning and showing respect to other cultural backgrounds, we also need to learn to do the right things at the right time. Cultural differences exist among different countries, for example, the Americans prefer to speak their minds while the Chinese are more comfortable with mild expressions. Before collaborating with people of different cultural backgrounds, it will be best to learn about their habits and preferences.
Role playing

Jessica is one of the volunteer team leaders at Orbis Hong Kong. Orbis’s fundraiser in Hong Kong this year will take place in three months. In order to ensure that all volunteers understand the objectives of this activity and the matters that require their attention, a briefing session will be held prior to the activity. Jessica is in charge of the briefing session. As the volunteer teams at Orbis are comprised of volunteers from many countries, Jessica hopes to cater for the needs of people of different cultural backgrounds in the briefing session. According to initial statistics, most volunteers signing up for the fundraiser come from China, Japan, the US and Spain. In her hopes to make the best arrangements, Jessica has found a few volunteers of those nationalities to form a “preparatory group”.

Website of Orbis: http://hkg.orbis.org/pages/contact-us1/

1. Work in groups of four, with each student representing one of the members of the “preparatory group”. Based on the background of your character (Chinese, Japanese, American or Spanish), collect information about that country’s culture and tradition, and make arrangements on the following for the briefing session:
   a. Date and time of the meeting
   b. Foods to be provided
   c. Languages to be spoken
   d. Languages to be used in documents

2. After discussion, what matters do you think we need to pay attention to when collaborating with people of different cultures?

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

3. What do you think are your strengths and weaknesses in collaborative problem solving?

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
5.4 Cross-cultural collaboration

What do you think of your performance in Class Activity (3)? Have you tried your best not to offend students of different cultural backgrounds? Or are you not sure if you have offended others?

Along with the development of globalization, we now have more opportunity to communicate with people from different countries and cultures. Sometimes, due to a lack of understanding about the cultural backgrounds of foreign countries, we may have unintentionally offended others. Therefore, before collaborating with people of different cultural backgrounds, it will be best to learn about their habits and preferences.

Now, we will briefly introduce some cultural differences from various perspectives. We should pay extra attention to these areas during cross-cultural collaboration in future.

The key learning objective of this lesson is not to develop a deep understanding on the cultural backgrounds of different places, but to help students understand from the above information that each culture is unique in its own way. Students should learn to be more sensitive about the cultural, religious and political views of others in communication and collaboration with people of different cultural backgrounds to avoid any unintentional offence.

Cultural differences

According to Dutch researcher Geert Hofstede, cultural differences include, among other dimensions, “power distance”, “uncertainty avoidance”, “individualism versus collectivism”, “masculinity versus femininity”, “long term orientation versus short term orientation” and “indulgence versus restraint”. Every country performs slightly differently in terms of these six dimensions. Let’s take a look at the following examples:
**Power distance**

Power distance reflects the degree to which a society accepts the unequal distribution of power. The higher the power distance, the more value is attached to titles and positions by people. For example, in a country of high power distance like Malaysia, people have a strong sense on social class, and are used to following instruction given by their superiors. On the contrary, Austria is a country of low power distance so Austrians are less bound by the concept of social class.

**Uncertainty avoidance**

The lower the degree to which a society accepts uncertainties, the less likely its people are to tolerate ambiguity. As a result, people will develop many regulations and systems, and ask everyone to comply with them. For example, the Japanese society is very much inclined to eliminate uncertainties and it is uncomfortable with risks and uncertainties. The Japanese prefer to reduce uncertainties through planning and regulations. On the contrary, Denmark is a society that relatively accepts uncertainties. Its people believe that uncertainties are an intrinsic part of life and will not deliberately avoid them. Therefore, it is easier for them to accept changes and new things.
**Individualism versus collectivism**

Individualism refers to the social frameworks in which people put personal interest first, while collectivism means that greater importance is attached to group interests. The US is an individualism-oriented country, where personal benefits and achievements are much valued. On the contrary, Japan is a country that promotes collectivism, where greater importance is attached to group performance than to personal gains or losses.

**Masculinity versus femininity**

A country’s preference for masculinity or femininity represents the degree to which it prefers assertiveness or caregiving. Japan has a preference for masculinity. It values power and achievements, and is inclined to adopt value standards of an assertive or aggressive nature. On the contrary, Sweden has a strong preference for femininity. It puts emphasis on mutual benefits, environmental protection and the pursuit of better quality of life.

**Long term orientation versus short term orientation**

Geert Hofstede thinks that a country of long term orientation, like China with its traditional wisdom, focuses on planning for the future and long-term benefits, and its social culture will promote perseverance and the value of a leeway. A country of short term orientation, like Norway, on the other hand, is more focused on immediate results, and its people take the performance of their own social obligations very seriously.

**Indulgence versus restraint**

It refers to the degree people suppress the gratification of their needs. The Swedish are willing to show that they have the impulse and urge to enjoy life and play, and they value quality of life and their leisure time. Indonesians, on the other hand, believe that enjoyment is bad and hence are more inclined to restrain their behaviours.

The above is based on the data and information obtained from the website of Geert Hofstede’s researches at: https://geert-hofstede.com/national-culture.html

However, the dimensions listed above can only help students gain a rough understanding on the various kinds of cultural differences. They are not intended to set cultural stereotypes on any country. Learning such cultural background differences can help students understand that one needs to be receptive, modest and open-minded when communicating or collaborating with people of different cultural backgrounds. There is no right or wrong, no high or low when it comes to cultures and customs.
Context culture

Apart from analysing the cultural differences of different countries from the six perspectives above, anthropologist Edward T. Hall also adopts high and low context cultures to compare the differences in cultural values among various countries. High-context cultures are those in which communication among people is primarily transmitted through “contextual elements” (e.g. body language, tone, even standing posture and position) instead of relying solely on “language itself”. Low-context cultures are those in which information is mainly communicated through words. The speakers need to express themselves explicitly. In addition to their different approaches to communication, these two context cultures also differ in other areas. Now we will explain the differences between high- and low-context cultures in detail:

- **High-context culture**
  - Mild and implicit approach to communication
  - Relatively flexible concept of time, no strict standards. For example, it is considered acceptable to show up at 4 o’clock at a date set for 3 o’clock
  - Preferring multi-tasking
  - Relationship-oriented, attaching great importance to reputation and long-term relationships
  - Promoting collectivism
  - Believing that space is shared and people interacting at intimate distances
● **Low-context culture**

✧ Direct and explicit approach to communication
✧ Strong concept of time, always on time. Single-tasking is preferred
✧ Task-oriented, attaching greater importance to the result of a task than the development of long-term relationships
✧ Promoting individualism
✧ Believing that space is divided and private, valuing personal space and privacy

5.5 How to collaborate with difficult people

Discussion Zone

1. Which the following do you least want to collaborate with?
   A. The bossy – take over works from others, love to command people
   B. The timid – keep everything to oneself, have no opinion
   C. The antsy – urge others to work faster
   D. The easily distracted – often lead the discussion off the track
   E. The emotional – often vent and be driven by one’s emotions
   F. The buzzkill – reject others’ opinions in the beginning

2. Which of the above types better describes you?

We always hope that we can meet friendly people when we collaborate with others. Yet sometimes we may just end up with someone who is unsociable. Difficult people are unpleasant to work with, and may even slow you down. Now what shall we do? Here are some tips for you:

- Never bring unpleasant experience from past collaboration to new collaborative projects.
- Put down your biases and focus on the works but not the people.
- Try walking in other people’s shoes. Think about the reasons why someone refuses to compromise on a certain point. Does it have something to do with his/her childhood memories or experiences?
- Even if you disagree with someone, you should believe that all of you share the same goal.
Words that make things worse

- **Blaming others** – “This is all your fault. Now you must make things right!”, “It wouldn’t have turned out this way if it wasn’t you!”
- **Blaming oneself excessively** – “It’s my fault. Just do as you wish!”
- **Sticking to one’s opinion** – “People will think it’s beautiful because I say so.”, “Everybody knows that he is an idiot. Of course you should follow my lead.”
- **Attacking others’ personalities, principles and motives** – “If you insist on doing it this way knowing very well that we have it all planned out, then you’re clearly kissing up to the teacher!”, “I know you mean well but don’t you know that you’re not at that level?”

- Focus on other people’s strengths, understand that we all have shortcomings and we should show our understanding to each other.
- Tell your teacher if you are being bullied.
Activity (4)

With the school open day just around the corner, the class teacher asked students to decorate the classroom board to help parents better understand their campus life. With the theme of “Our Class”, students may use photos, paintings, words or other ways to decorate the board.

1. Students form groups of two. Discuss and plan how to decorate the board with the following roles.

   Role A: Charles
   - Patient
   - Supportive and encouraging
   - Actively participates in group discussion

   Role B: Harry
   - Antsy, often interrupts other people when they talk
   - Often dampens others’ suggestions, even with verbal attacks
   - Not interested in group discussion, never makes any constructive suggestion

2. In addition to the decoration of the classroom board, the teacher asks you to design a stall game for the Science Club. Students in each group switch their roles, e.g. those who have acted as Charles will now be Benjamin, and then work together to design an interesting stall game.

Summary
After the activity, teachers invite students to share their feelings about collaborating with difficult people, with an aim to develop empathy among students through the sharing session.
Types of conflicts

In general, there are three types of conflicts identified in Organisational Behaviour.

1. Task conflicts
   - Group members have different opinions or decisions on the task, e.g. its details, direction, objectives, etc.

2. Relationship conflicts
   - Group members have difficulty getting along with each other, e.g. not liking each other.

3. Process conflicts
   - Group members have different ideas on how to accomplish the task, e.g. assignment of duties and work order of the task.

Relationship conflicts are the most detrimental to work performance, and also the most difficult to handle. While minor task or process conflicts may not damage the result, they may develop into relationship conflicts if handled improperly.

How to handle conflicts

1. **Step 1: Calm down**
   - 1.1 Stay calm, never escalate a conflict.
   - 1.2 Start handling the conflict at an early stage.
   - 1.3 While small conflicts may be inevitable, they are not necessarily bad things. They can be taken as a sign of members engaging in the work.

2. **Step 2: Analyse objectively**
   - 2.1 Face the conflict head on, take the initiative to find the solutions.
   - 2.2 Never viciously blame or attack group members, always offer appropriate and constructive comments.
   - 2.3 Listen to different opinions with an open and fair attitude.
   - 2.4 Ask members to write down and repeat how they understand the problem and the stance of each side, so as to ensure that each member has fully comprehended the problem.

3. **Step 3: Seek solution(s)**
   - 3.1 Adopt appropriate expressions and choose appropriate time and place to handle
the conflict.

3.2 Work together to come up with solutions or make compromises as appropriate.
3.3 Ask the teacher to intervene if necessary.

Activity (5)

1. Teachers ask students to look back on an experience where they had a conflict with someone or to search for a piece of news about a conflict.

2. After picking one case and briefly introducing its background to the whole class, the members of each group have to write down 2 to 5 methods for handling the conflict and sort them in order (allow approximately 3 minutes, ask students not to overthink).

3. Summarise to see which of the following categories do the first 2 methods given by each of the students fall under:
   a) Avoidance (e.g. asking all parties to calm themselves, changing the subject)
   b) Confrontation (e.g. refuting, persuading other members towards objection)
   c) Tolerance (e.g. I’ll do more if others do less)
   d) Compromise (e.g. letting all parties take the fault equally, asking all of them to comprise)
   e) Win-win (e.g. finding an approach that works for all parties)

4. Teachers have to point out that a person can adopt any of the above 5 methods to handle conflicts under different situations but people tend to have preference on a method or two. Students should learn about the methods usually adopted by other group members.

5. Discuss in group the handling methods for the case mentioned written down by each group member.

6. Finally each group needs to reach a common ground on how to handle similar issues in future and write down some codes of conduct as suggested by group members. (Example: never use insulting words when confronted by a conflict)
Prevention is better than cure. The best way to handle conflicts is not to let conflicts occur. On the one hand, we need to learn to accept the fact that people have their limitations and different personalities. It is difficult to be loved by the whole world and to get along with everyone. On the other hand, the best way to deal with difficult people is try not to be difficult people ourselves, which relies on our self-reflection and the establishment of codes of conduct for a group/team/community. Harmonious collaboration is made easy when everyone follows the rules. Most problems are not difficult to overcome as long as we believe that working as a team is better than flying alone. In case problems occur, we can try the <7-step-approach to problem solving> and find the right solutions with the help of creativity and critical thinking!

Advanced questions:
1. It is always delicate when we interact and work with other people. Is it possible that someone being considered difficult in a certain group may become easy in another group?
2. How to differentiate between “giving up and switch groups” and “putting the right person at the right position”?
References


顧伊麗、侯傑泰、何德芳 (2009)。「批判性思考能力的學與教」教材套 (高中)。

Appendix I

Nine Generic Skills (updated in 2016):

Communication Skills

Communication skills refer to the abilities to achieve the desired outcomes or goals in a process where two or more people interact (be it in a face-to-face or virtual context) through expressing or receiving messages using verbal and non-verbal means. To communicate effectively, students should learn to listen, speak, read and write competently. Not only should they express themselves in an accurate, organised and proper manner, but also understand and respect others’ views and expectations, and use appropriate information and means to convey a message in accordance with the purpose, context and audience. They should also evaluate the effectiveness of their communication and identify areas for improvement to achieve the best results.

<table>
<thead>
<tr>
<th>Key Stage 1</th>
<th>Key Stage 2</th>
<th>Key Stage 3</th>
<th>Key Stage 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will learn to</td>
<td>Students will learn to</td>
<td>Students will learn to</td>
<td>Students will learn to</td>
</tr>
<tr>
<td>• comprehend and act appropriately on spoken</td>
<td>• comprehend and respond to different types of</td>
<td>• understand, analyse, evaluate and respond to</td>
<td>• listen and read critically, evaluate the</td>
</tr>
<tr>
<td>instructions</td>
<td>texts</td>
<td>a range of different types of texts</td>
<td>messages conveyed in information from different</td>
</tr>
<tr>
<td>• comprehend the explicit messages conveyed in</td>
<td>• comprehend and infer the messages conveyed in</td>
<td>• synthesise the messages conveyed in information</td>
<td>media and express ideas fluently in accordance</td>
</tr>
<tr>
<td>information from different media</td>
<td>information from different media</td>
<td>from different media</td>
<td>with the audience and reader</td>
</tr>
<tr>
<td>• use clear and appropriate means of communication,</td>
<td>• use spoken, written, graphic and other non-verbal</td>
<td>• use appropriate language and/or other forms of</td>
<td>• use appropriate means of communication to</td>
</tr>
<tr>
<td>both verbal and non-verbal, to express meaning and</td>
<td>means of expression to convey information and</td>
<td>communication to present information and different</td>
<td>inform, entertain, persuade and argue to</td>
</tr>
<tr>
<td>feelings</td>
<td>opinions, and to explain ideas</td>
<td>points of view, and to express feelings</td>
<td>achieve expected outcomes</td>
</tr>
<tr>
<td>• work and discuss with others to accomplish</td>
<td>• work and negotiate with others to develop ideas</td>
<td>• work and negotiate with others to solve</td>
<td>• resolve conflicts and solve problems with</td>
</tr>
<tr>
<td>simple tasks</td>
<td>and accomplish tasks</td>
<td>problems and accomplish tasks</td>
<td>others to accomplish tasks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• reflect and improve on the effectiveness of</td>
<td>• evaluate the effectiveness of their</td>
</tr>
<tr>
<td></td>
<td></td>
<td>their own communication</td>
<td>communication with others from different</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>perspectives for further improvement</td>
</tr>
</tbody>
</table>
Mathematical Skills

Mathematical skills include the ability to perform computations and estimations of numbers in various forms, to describe spatial relationships between objects, to perform measurements, to manage data, to employ logical reasoning for drawing valid conclusions, and to apply mathematical concepts in different contexts.

<table>
<thead>
<tr>
<th>Key Stage 1</th>
<th>Key Stage 2</th>
<th>Key Stage 3</th>
<th>Key Stage 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will learn to</td>
<td>Students will learn to</td>
<td>Students will learn to</td>
<td>Students will learn to</td>
</tr>
<tr>
<td>• perform comparison and basic computations of whole numbers</td>
<td>• perform computations and simple estimations involving whole numbers, fractions, decimals and percentages, such as estimating expenses</td>
<td>• handle very large or very small numbers and negative numbers with a sense of scale</td>
<td>• evaluate the appropriateness of tools and strategies for handling quantitative information</td>
</tr>
<tr>
<td>• describe shapes, sizes and positions</td>
<td>• use simple geometric properties, such as symmetry, parallel and perpendicular, to describe shapes, sizes and positions more accurately</td>
<td>• perform numerical manipulations, such as percentage changes, and perform estimations with appropriate strategies</td>
<td>• use quantitative information for making informed decisions in different contexts</td>
</tr>
<tr>
<td>• apply the knowledge of measurement and use appropriate units and tools for measurement</td>
<td>• apply strategies and formulae in measurement</td>
<td>• describe the rules of arrangement of objects or occurrence of events, such as the pattern formed by a set of shapes and the trend of population growth</td>
<td>• evaluate processes of deductions to avoid committing logical fallacies</td>
</tr>
<tr>
<td>• present data by means of and retrieve information from simple charts and graphs</td>
<td>• collect and process data, present data by means of suitable charts and graphs and retrieve information from charts and graphs</td>
<td>• choose appropriate tools and strategies to find measurements according to the degree of accuracy required by the specific purpose</td>
<td>• apply various mathematical concepts in different contexts with appropriate strategies and be aware of the need to make adaptations in new situations</td>
</tr>
<tr>
<td>• perform simple deductions with the use of basic logical concepts, such as “and”, “or”, “all”, “some”, “because”, “if … then” and “contradiction”</td>
<td>• perform deductions, such as syllogism and provide counter examples</td>
<td>• use different methods for handling (i.e. collecting, organising, analysing and presenting) quantitative information and make reasonable interpretation of the results</td>
<td></td>
</tr>
<tr>
<td>• apply simple mathematical knowledge in daily life</td>
<td>• apply mathematical concepts in daily life</td>
<td>• estimate risks and chances through the use of elementary probability</td>
<td>• apply various mathematical concepts in authentic situations</td>
</tr>
</tbody>
</table>

2 In the context of generic skills, Mathematical Skills refer to the ability to apply mathematics in different key learning areas and subjects. The concepts and skills of the Mathematics subject to be applied are only those generally applicable to various disciplines.
## Information Technology Skills

Information technology skills are the ability to use IT critically to search, select, analyse, manage and share information. Mastery of IT skills facilitates collaborative learning, problem solving and self-directed learning.

<table>
<thead>
<tr>
<th>Key Stage 1</th>
<th>Key Stage 2</th>
<th>Key Stage 3</th>
<th>Key Stage 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will learn to</td>
<td>Students will learn to</td>
<td>Students will learn to</td>
<td>Students will learn to</td>
</tr>
<tr>
<td>• operate computers or mobile devices</td>
<td>• use a variety of software packages for word-processing, calculation, image-processing and other learning activities</td>
<td>• use appropriate IT tools to facilitate learning</td>
<td>• strengthen capability in IT usage for lifelong learning</td>
</tr>
<tr>
<td>• input Chinese characters</td>
<td>• produce multimedia presentations with simple design</td>
<td>• use IT tools and strategies for processing and presenting information</td>
<td>• analyse and ethically use information from different sources for specific purposes</td>
</tr>
<tr>
<td>• use e-resources to support learning with the help of teachers</td>
<td>• search, select and prudently share information via computer networks and other media</td>
<td>• produce multimedia presentations with appropriate design for different purposes</td>
<td>• compare the effectiveness of various ways, including the use of IT tools, to solve a given problem</td>
</tr>
<tr>
<td>• recognise some methods to locate and access information with given search criteria</td>
<td>• process information and produce user-generated content using IT tools</td>
<td>• communicate and collaborate with others via computer networks and other media</td>
<td>• select and apply appropriate IT tools in different aspects of study, including processing information, generating and communicating original ideas artfully to audience with different backgrounds</td>
</tr>
<tr>
<td>• generate, present, and safely share ideas with IT tools in learning activities</td>
<td></td>
<td>• verify and evaluate the accuracy and reliability of information</td>
<td></td>
</tr>
</tbody>
</table>

3 User-generated content refers to content that is produced and shared by end-users of digital media.
## Critical Thinking Skills

Critical thinking is drawing out meaning from available data or statements, and examining and questioning their accuracy and credibility in order to establish one’s views and evaluate the arguments put forward by oneself and others.

<table>
<thead>
<tr>
<th>Key Stage 1</th>
<th>Key Stage 2</th>
<th>Key Stage 3</th>
<th>Key Stage 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will learn to</td>
<td>Students will learn to</td>
<td>Students will learn to</td>
<td>Students will learn to</td>
</tr>
<tr>
<td>• extract, classify and organise information</td>
<td>• make inductions/inferences from sources</td>
<td>• identify the issue at stake</td>
<td>• differentiate between real and stated issues, false and accurate representations, and relevant and irrelevant evidence</td>
</tr>
<tr>
<td>• identify and express main ideas, problems or core issues</td>
<td>• cross-reference other sources to determine the reliability of a source</td>
<td>• clarify and define key words to guide thinking</td>
<td>• differentiate between sophisticated fact, opinion and reasoned judgement</td>
</tr>
<tr>
<td>• understand straightforward cause-and-effect relationships</td>
<td>• understand the concepts of relevance and irrelevance</td>
<td>• compare information from different sources, note contrasts and similarities, and determine its reliability</td>
<td>• recognise and challenge subtle or fundamental assumptions, permeating value orientations and ideologies</td>
</tr>
<tr>
<td>• distinguish between obvious fact and opinion</td>
<td>• distinguish between fact and opinion as well as source and evidence</td>
<td>• differentiate between fact, opinion and reasoned judgement</td>
<td>• recognise that the selection and deployment of information/facts are affected by personal perspectives</td>
</tr>
<tr>
<td>• notice obvious contradictions, seek clarifications and make simple predictions</td>
<td>• recognise obvious inconsistencies, omissions, assumptions, stereotypes and biases</td>
<td>• recognise that information providers’ value orientations and ideologies would affect the perspectives or judgement of sources</td>
<td>• draw warranted conclusions, predict and assess probable consequences and make reasoned judgement in reading, writing and speech</td>
</tr>
<tr>
<td>• draw simple but logical conclusions not contradictory to given data and evidence</td>
<td>• formulate appropriate questions, and make reasonable predictions and hypotheses</td>
<td>• recognise and challenge stereotypes, emotional factors, propaganda and fallacies</td>
<td>• apply appropriate thinking skills to evaluate and reflect on their thinking process and suggest ways for improvement</td>
</tr>
<tr>
<td></td>
<td>• draw logical conclusions based on adequate data and evidence, and make predictions about consequences</td>
<td>• draw and test conclusions as well as hypotheses, identify reasonable alternatives and predict probable consequences</td>
<td></td>
</tr>
</tbody>
</table>
Creativity

Creativity is the ability to generate new forms and is manifested in new ideas, acts or products. It emerges spontaneously or through deliberate thinking. It involves the integration of general or domain-specific knowledge for a meaningful purpose.

Of the students in this generic skill cannot be suitably classified according to Key Stages, development of dispositions, dispositions and favourable factors for nurturing creativity.

<table>
<thead>
<tr>
<th>Traits from observation and quickly respond to stimulus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numerous ideas promptly</td>
</tr>
<tr>
<td>Dilemma and ideas and to initiate new thoughts for action</td>
</tr>
<tr>
<td>Unusual, novel and unique ideas</td>
</tr>
<tr>
<td>Fine and embellish ideas</td>
</tr>
<tr>
<td>Persistence and desire to find out more</td>
</tr>
<tr>
<td>Creative and determination to deal with uncertainties or ambiguities</td>
</tr>
<tr>
<td>Resourcefulness and persistence</td>
</tr>
<tr>
<td>Innovation and creative thinking</td>
</tr>
<tr>
<td>Experimentation and evaluating new ideas</td>
</tr>
<tr>
<td>Break through barriers to new ideas</td>
</tr>
<tr>
<td>Ideas generation and development as per need</td>
</tr>
</tbody>
</table>
3. Favourable Factors for Nurturing Creativity

<table>
<thead>
<tr>
<th>Favourable Factors</th>
<th>Corresponding actions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Place</strong></td>
<td>• To foster a supportive environment (open, inviting and accepting atmosphere; resourceful, safe yet stimulating environment)</td>
</tr>
<tr>
<td><strong>Person</strong></td>
<td>• To recognise and accommodate the wide range of attributes and dispositions of students (strengths, weaknesses, learning styles, learning needs, motivation and readiness)</td>
</tr>
<tr>
<td></td>
<td>• To identify and develop students' potential for creative acts</td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td>• To open up alternatives for students to explore personal interest</td>
</tr>
<tr>
<td></td>
<td>• To provide interesting and stimulating themes conducive to arousing creative acts and satisfying a craving</td>
</tr>
<tr>
<td></td>
<td>• To expose students to various stages of creating new ideas, acts or products (preparation, incubation, illumination and verification)</td>
</tr>
<tr>
<td></td>
<td>• To value attempts to present new ideas and encourage further refinements</td>
</tr>
<tr>
<td><strong>Product</strong></td>
<td>• To encourage creative actions and output (ideas, plans, methods, solutions, products, theories)</td>
</tr>
<tr>
<td></td>
<td>• To value the creative experience and celebrate students’ creative output</td>
</tr>
<tr>
<td></td>
<td>• To encourage students to persuade others (especially experts in the field) to accept the creative output</td>
</tr>
</tbody>
</table>

---

### Problem Solving Skills

Problem solving involves using various skills to resolve a difficulty. The process includes investigating the problem, synthesising information and generating ideas to determine the best course of action. Students need to adjust and evaluate strategies, as well as consolidate experience for knowledge construction.

<table>
<thead>
<tr>
<th>Key Stage 1</th>
<th>Key Stage 2</th>
<th>Key Stage 3</th>
<th>Key Stage 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will learn to</td>
<td>Students will learn to</td>
<td>Students will learn to</td>
<td>Students will learn to</td>
</tr>
<tr>
<td>• develop ideas about the problem and identify related sources of information</td>
<td>• identify the problem and describe its main features</td>
<td>• explore the problem and identify its main focus</td>
<td>• recognise the complexity of the problem and search for appropriate information required to solve it</td>
</tr>
<tr>
<td>• identify, under guidance, one or more ways of tackling the problem</td>
<td>• propose alternative courses of action for solving it</td>
<td>• suggest and compare the possible outcomes of each alternative course of action and justify the option selected</td>
<td>• formulate feasible strategies to achieve optimal results, considering both long and short term objectives</td>
</tr>
<tr>
<td>• choose and implement a solution plan, using support and advice given</td>
<td>• plan and try out the selected option, obtain support and make changes when needed</td>
<td>• execute the planned strategy, monitor the progress and make adjustment when necessary</td>
<td>• modify objectives or strategies and suggest remedial or enhancing measures to cope with circumstantial changes or difficulties</td>
</tr>
<tr>
<td>• follow the given step-by-step methods to check and describe the outcomes</td>
<td>• develop an appropriate method to measure the effectiveness of the solution plan adopted</td>
<td>• evaluate against established criteria the quality of outcomes, and review the effectiveness of the problem solving process</td>
<td>• evaluate the overall strategy and outcomes, and anticipate future problems that may be incurred</td>
</tr>
<tr>
<td></td>
<td>• gain insights from the problem solving process</td>
<td>• formulate personal views, and paraphrase or construct analogies to explain how the problem is solved</td>
<td>• consolidate experience on problem solving for knowledge construction</td>
</tr>
</tbody>
</table>
Self-management Skills

Self-management skills comprise essential life skills and desirable personal qualities such as maintaining emotional stability, making decisions and exercising self-discipline. Self-management skills enable students to embrace challenges encountered on a personal or team basis.

The expected achievements of the students in this generic skill are classified according to different levels of mastery.

<table>
<thead>
<tr>
<th>Elements of Self-management Skills</th>
<th>Beginning -----------------------------------------------</th>
<th>Developing -----------------------------------------------</th>
<th>Mastering -----------------------------------------------</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will learn to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-worth</td>
<td>• express positive statements about themselves</td>
<td>• identify and apply personal skills, attitudes and values to overcome challenges</td>
<td>• uphold, synthesise and renew their own beliefs and values</td>
</tr>
<tr>
<td>Goal setting and tracking</td>
<td>• set goals to assist their learning and personal development</td>
<td>• set and keep track of realistic goals</td>
<td>• set, keep track of, and be reflective on and accountable for goals which work towards excellence in life</td>
</tr>
<tr>
<td>Decision making</td>
<td>• make decisions in daily life situations with supporting reasons</td>
<td>• list out and evaluate the pros and cons of a suggestion, and make prediction about the consequences of a decision</td>
<td>• consider all factors, such as technical, ethical, resource and community considerations before making a decision</td>
</tr>
<tr>
<td>Confidence, resilience and adaptability</td>
<td>• develop confidence and resilience in performing simple tasks and appreciate the progress made</td>
<td>• demonstrate motivation, confidence, commitment and adaptability when facing new or difficult situations, and derive satisfaction from accomplishments and efforts</td>
<td>• demonstrate confidence and adaptability in adversities, tolerate ambiguities and appreciate lessons learnt from mistakes</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Appropriate expression of emotions</td>
<td>• understand, accept and appropriately express emotions</td>
<td>• describe their feelings, such as joy and disappointment and identify factors contributing to these feelings</td>
<td>• use appropriate means to contain or release their emotions</td>
</tr>
<tr>
<td>Managing resources</td>
<td>• demonstrate care for personal properties and shared resources</td>
<td>• treasure and make good use of time, money and other resources</td>
<td>• suggest ways for effective, equitable and ethical use of resources</td>
</tr>
<tr>
<td>Keeping promises to others</td>
<td>• keep promises and fulfill obligations</td>
<td>• assess feasibility before making promises</td>
<td>• make determined efforts to keep promises</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• take responsibility and make up for broken promises obliged by circumstances</td>
</tr>
<tr>
<td>Self-discipline</td>
<td>• exercise self-control against distractions, and focus on and complete given tasks at hand within a given time</td>
<td>• extend self-control in scope and duration over personal impulses through developing positive thinking and self-affirmation</td>
<td>• exercise self-control naturally as a habit of mind</td>
</tr>
<tr>
<td>Reflective practice</td>
<td>• review their learning readily to know more about themselves and how they work</td>
<td>• form habits of reviewing their learning and identify factors that contribute to or hinder their learning effectiveness</td>
<td>• sustain self-improvement by paying attention to and making judicious use of feedback</td>
</tr>
</tbody>
</table>
Self-learning Skills

Self-learning skills refer to the ability to initiate, plan, carry out, evaluate and adjust learning activities autonomously. Students with advanced self-learning skills can select or design effective strategies for in-depth learning. These skills help students enhance their academic performance and self-efficacy. Self-learning skills form the core part of lifelong learning and help students acquire new knowledge to adapt to the fast changing world.

<table>
<thead>
<tr>
<th>Key Stage 1</th>
<th>Key Stage 2</th>
<th>Key Stage 3</th>
<th>Key Stage 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will learn to</td>
<td>Students will learn to</td>
<td>Students will learn to</td>
<td>Students will learn to</td>
</tr>
<tr>
<td>• consciously listen and read to learn, and actively present their learning</td>
<td>• take initiative in the enquiry learning area selected by themselves</td>
<td>• initiate learning activities and apply relevant personal strengths to overcome challenges</td>
<td>• initiate challenging learning activities and develop relevant personal strengths to overcome challenges</td>
</tr>
<tr>
<td>• concentrate and pay attention to instructions</td>
<td>• actively locate required information from different media</td>
<td>• set learning plans with stage-wise goals</td>
<td>• plan and set goals for self-initiated enquiries</td>
</tr>
<tr>
<td>• identify and retain main ideas</td>
<td>• take initiative in identifying and organising main points from different sources, e.g. note-taking, mind-mapping</td>
<td>• identify lines of reasoning and possible hidden ideas in sources</td>
<td>• autonomously select or design more effective learning strategies for in-depth learning</td>
</tr>
<tr>
<td>• collect information from given sources and organise it into pre-determined categories</td>
<td>• decide on the most suitable means to present ideas and demonstrate learning</td>
<td>• function effectively in a group to achieve the learning goals</td>
<td>• evaluate key ideas, opinions and arguments identified from different sources independently, and synthesise them to construct and develop their own interpretation</td>
</tr>
<tr>
<td>• try out different means to present ideas and demonstrate learning</td>
<td>• seek help appropriately when necessary</td>
<td>• decide on the most suitable means to manage and present knowledge</td>
<td>• evaluate and suggest ways to improve the effectiveness of learning strategies</td>
</tr>
<tr>
<td>• develop simple learning plans to meet short term targets</td>
<td>• manage time to complete tasks according to a plan</td>
<td>• make use of feedback to reflect on the effectiveness of different learning tactics</td>
<td>• adjust the learning strategies to improve learning effectiveness</td>
</tr>
<tr>
<td>• show interest in enquiring further</td>
<td>• make use of feedback to reflect on the effectiveness of different learning tactics</td>
<td></td>
<td>• learn beyond the prescribed curriculum and apply knowledge in a variety of contexts</td>
</tr>
</tbody>
</table>
Collaboration Skills

Problem solving, planning and making decisions in a small group require collaboration skills, namely the skills of communication, appreciation, negotiation, making compromises and asserting leadership. Students with these skills will be able to effectively engage in and contribute to tasks involving teamwork.

The expected achievements of the students in this generic skill cannot be suitably classified according to Key Stages.

1. Understanding the nature of group work

Students will learn to

- recognise the need for teamwork and that the team has a shared responsibility
- recognise that individuals as well as the team have to take the consequences for their own actions

2. Desirable dispositions for group work

Students will learn to

- be open and responsive to others’ ideas; appreciate, encourage and support the ideas and efforts of others
- be active in discussing and posing questions to others, as well as in exchanging, asserting, defending and rethinking ideas
- recognise and avoid stereotyping; withhold premature judgement until the facts are known
- be willing to adjust their own behaviour to fit the dynamics of various groups and situations
### 3. Skills for group work

**Students will learn to**

<table>
<thead>
<tr>
<th><strong>Goal setting</strong></th>
<th>• select a strategy and plan cooperatively to complete a task in a team</th>
</tr>
</thead>
</table>
| **Role taking**           | • understand the strengths and weaknesses of members and maximise the potential of the team  
                            | • clarify and accept various roles and responsibilities of individual members in a team and be willing to follow team rules |
| **Synergising**           | • liaise with members for views and resources  
                            | • negotiate and compromise with others |
| **Reflection**            | • reflect on and evaluate the strategy used by the group and make necessary adjustments |
**Collaborative Problem Solving Skills**

Collaborative problem solving skills, an example of integrative use of generic skills, refers to students’ ability to solve problems with synergised efforts through effective division of labour, incorporation of information from multiple sources of knowledge, perspectives and experiences. Compared to individual problem solving, collaborative problem solving has distinct advantages because it enhances the creativity and quality of solutions through stimulation brought by the ideas of other group members. In the 21st Century, it is particularly important for people with different perspectives and talents to solve problems as a team with the effective use of communication technology.

The expected achievements of the students in collaborative problem solving skills are classified according to different levels of mastery.

Students will learn to

<table>
<thead>
<tr>
<th>Beginning</th>
<th>Developing</th>
<th>Mastering</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collaboration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• be ready to act responsively and reach the goals with team members</td>
<td>• share other team members’ perspectives on the problem and establish a common understanding</td>
<td>• treasure working as a team and take initiative to foster synergy for attaining the team goals</td>
</tr>
<tr>
<td>• follow the rules and instructions set for the team work</td>
<td>• identify and capitalise on the talents and potential of members</td>
<td>• show mutual respect and support when dealing with difficult people and situations</td>
</tr>
<tr>
<td>• participate actively in the team and contribute to achievement of the team goals</td>
<td>• be able to work with different people and accept the adjustments to plans or roles in changing situations</td>
<td>• take initiative to propose plans or make adjustments to the plans and roles in changing situations</td>
</tr>
</tbody>
</table>

5 *Adapted from OECD 2015 PISA Framework*
<table>
<thead>
<tr>
<th>Beginning</th>
<th>Developing</th>
<th>Mastering</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• comprehend messages with an open mind and ask questions to identify the problem and team goals</td>
<td>• ask meaningful questions that clarify the vision, goals and viewpoints for better solutions</td>
<td>• negotiate for consensus and foster a cooperative atmosphere to resolve conflicts</td>
</tr>
<tr>
<td>• express oneself clearly to team members by verbal and/or non-verbal means</td>
<td>• respond specifically to queries raised during the problem solving process</td>
<td>• take the initiative in introducing new resources and exploring further ideas to facilitate the team to progress further</td>
</tr>
<tr>
<td>• show courage in sharing new or unconventional ideas</td>
<td>• enhance mutual understanding through effective means and with a respectful attitude</td>
<td></td>
</tr>
<tr>
<td><strong>Problem Solving</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• propose solutions or strategies to solve a problem</td>
<td>• select a problem solving strategy and develop an action plan</td>
<td>• select a problem solving strategy and prepare alternative plans</td>
</tr>
<tr>
<td>• complete the task assigned to one’s role in the team</td>
<td>• execute actions that comply with the planned distribution of roles and make adjustments when necessary</td>
<td>• monitor and evaluate individual and team effectiveness</td>
</tr>
</tbody>
</table>
**Holistic Thinking Skills**

Critical thinking skills, creativity and problem solving skills are conventionally categorised as higher order thinking skills. These three skills can be combined and employed integratively as holistic thinking skills to deal with complex issues. Holistic thinking skills enable students to deploy critical thinking skills to assess the validity of given information, creativity to explore other possibilities, and problem solving skills to examine the feasibility of each alternative.

The expected achievements of the students in holistic thinking skills are classified according to different levels of mastery.

Students will learn to

<table>
<thead>
<tr>
<th>Beginning</th>
<th>Developing</th>
<th>Mastering</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Critical Thinking: enquiring and assessing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• ask questions to explore matters that attract interest</td>
<td>• pose questions to explore issues related to their immediate contexts</td>
<td>• pose questions that probe complex and abstract ideas about issues beyond local context and contemporary period</td>
</tr>
<tr>
<td>• identify main ideas and clarify meaning in information</td>
<td>• comprehend complementary and contradictory information</td>
<td>• synthesise points from complementary and contradictory information</td>
</tr>
</tbody>
</table>

<p>| <strong>Creativity: generating</strong> | | |
| • come up with new ideas by linking imagination and reality | • draw parallels between known and new scenarios and use ideas, patterns and trends to consider new possibilities | • generate a large number of raw ideas |
| • create analogies by matching two ideas | • produce alternative or unconventional solutions | • combine good ideas to make even better ideas |
| • brainstorm suggestions | • suspend judgement to consider alternative ideas and actions | • use existing knowledge in a novel way |
| | | • temporarily suspend pragmatic and rational thinking to allow new possibilities to emerge |</p>
<table>
<thead>
<tr>
<th>Beginning</th>
<th>Developing</th>
<th>Mastering</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Critical Thinking and Problem Solving: analysing and comparing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• realise real world constraints in drafting solutions</td>
<td>• estimate the cost and benefit of possible solutions from multiple perspectives</td>
<td>• compare the possible outcomes of each solution against both their own and prevailing values</td>
</tr>
<tr>
<td>• compare advantages and limitations of various solutions</td>
<td>• rate and select solutions according to criteria, such as feasibility, desirability and ethical considerations</td>
<td>• mediate opposing viewpoints and acknowledge the limitations of one’s view</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• synthesise different considerations into a solution</td>
</tr>
<tr>
<td><strong>Creativity and Problem Solving: predicting and fine-tuning</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• ask “what if” questions</td>
<td>• make adjustments to avoid possible pitfalls (e.g. ambiguity, stereotyping and misunderstandings) in planning and presentation of solutions</td>
<td>• fine tune plans with reference to new developments</td>
</tr>
<tr>
<td>• consider ways of tackling possible consequences</td>
<td>• consider alternative courses of action in changing situations</td>
<td>• be sensitive to stakeholders’ reactions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• anticipate adverse impacts and suggest precautionary or compensatory measures accordingly</td>
</tr>
<tr>
<td>Beginning</td>
<td>Developing</td>
<td>Mastering</td>
</tr>
<tr>
<td>-----------</td>
<td>------------</td>
<td>-----------</td>
</tr>
<tr>
<td><strong>Problem Solving: executing and monitoring</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• choose a solution and devise an implementation plan, using support and advice given</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• turn the plan into workable parts with measures for implementation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Problem Solving and Critical Thinking: evaluating and reflecting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• reflect on whether the task is accomplished</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• be open to comments and feedback</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• execute the plan, monitor progress and revise the strategies when necessary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• realize the adverse effect of over-reacting and using emotional words</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• monitor the progress with established check points or criteria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• suggest ways to catch up with delays or optimise the results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• manage over-reactions and strong emotions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• evaluate the quality of outcomes and the solution process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• invite and evaluate feedback</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• evaluate the effectiveness of solutions with due regard for positive values</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• anticipate possible problems arising from the solution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• make judicious use of comments and feedback</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix II

What is critical thinking?

"Critical thinking" does not mean criticising or judging others, but the ability to question and carry out rational thinking (Ennis, 1987). It is not to criticise others, but to express ideas or questions in a modest and mild manner based on an objective analysis of valid facts and reliable evidence. It means adopting a comprehensive and multifaceted approach for a rational understanding of problems. Therefore, from 2015 onwards, the EDB has recommended to use "明辨性思考" (literally, "discerning thinking") as the Chinese translation for "critical thinking", so as to emphasise the essence of thinking with prudence and discernment.

The curriculum documents of some countries integrate the elements of problem solving into critical thinking, which is similar to the concept of holistic thinking mentioned in this resource booklet. In other words, the feasibility of a plan should also be considered. We will labour in vain if the plan we put forward is theoretically perfect but practically infeasible. In many cases, the reality does not allow us to adopt a seemingly best-of-breed solution. Sometimes we even need to make a choice between two imperfect options. Therefore, we must learn how to make different judgements and estimations by means of critical thinking, so as to find out the most favourable and viable approach.

How do we think critically?

1. Multifaceted data collection:
   Collect and compare relevant information from multiple perspectives, in order to investigate the truth from all aspects.

2. Avoid jumping to conclusions:
   After receiving information, do not simplify things instantly or jump to conclusions. Go through the reflection process first, i.e., think about other possibilities and let the information sink in. During the reflection process, many hypotheses will be derived. The hypotheses should be verified before conclusions are made.

3. Evaluation of information (hypothesis and argumentation):
   After we have collected information from different perspectives, we can start evaluating the information. There are two parts in the evaluation process that we need to be aware of:
(A) What is the evidence? and (B) Is the source of information reliable?

Peter saw a young man sitting on a priority seat in the MTR. He immediately jumped to the conclusion that the young man had no respect for the elders and did not like to obey rules.

Fact: The young man has just recovered from a severe illness and is physically weak. He took the priority seat only after making sure there were no elders or people in need in the train compartment.

Peter's thinking process:
Young man = young and strong;
Sitting on a priority seat = ignoring the needs of the elders; therefore the young man = shows no respect for the elders and does not abide by rules.

In fact, the young man is not a person who disrespects the elders. Can you think of any reason why he has taken the priority seat?
Errors to avoid in argumentation:

1. Over-generalisation
   
   *Example:* The girls in my class do not like sports. My mother and my sister do not like sports too. Therefore, all females do not like sports.

2. Fallacy of slippery slope
   
   The slippery slope argument occurs when we use a series of causal inferences one after another, and eventually reach an unreasonable conclusion, i.e., "If A happens, then B happens, and then C, ... and finally Z happens." It is a fallacy because there are many different possibilities between each inference. Some are inevitable, while others do not necessarily happen. If we exaggerate or distort the causal strength of each link and join the unreasonable causal relations together, the final conclusion will be invalid. This will result in the fallacy of slippery slope.
   
   *Example:*
   
   I will have less time for study if I join extra-curricular activities. If I have less time for study, my grades will be bad. If my grades are bad, I will not be able to go to university. Therefore, if I join extra-curricular activities, I will not be able to go to university.

3. Causal relationship
   
   When two things are related, it does not necessarily mean that they have a causal relationship.
   
   *Example:*
   
   When more raincoats are sold, there are more slip and fall accidents. Therefore, raincoats cause slips.

Common factors affecting logical analysis:

1. Blind obedience to authority
2. Blind adoption of public opinions
3. Subjectivity

Further reading

Kelly Ku, Kit-Tai Hau, and Irene T. Ho (2009). Package on "The Learning and Teaching of Critical Thinking Skills" (Senior Secondary)

Appendix III

Models of cooperative learning

(I) Student Team Learning (STL)

STL is a teaching approach developed by Professor Robert E. Slavin and his associates at Johns Hopkins University in the United States. There are four main teaching designs in STL, namely, STAD, TGT, TAI and CIRC. STAD and TGT are generally applicable to most subjects and grades, while TAI and CIRC are more suitable for the integrated curriculum design of some specific academic subjects and grades. Although STL can be implemented in four different designs, they all feature three core concepts: individual accountability, equal opportunities for success and team rewards. We will focus on STAD and TGT here.

- Student Teams-Achievement Divisions (STAD):
  STAD is the most common group teaching approach in cooperative learning. It is applicable to most subjects and grades. Students form teams of four or five members with mixed ability, gender or ethnicity. The teacher will firstly deliver a lesson to the whole class, then students have to work within their teams and help their team members to master the knowledge. The teacher will give weekly quizzes to assess the learning progress of each team. The overall score of a team is based on the performance of individual students. Points are awarded on the basis of how much students exceed their own previous performance. Therefore, all students have equal chance to get full marks. They will be motivated to win as many points as they can for their teams. Rewards will be given to every team that reaches the standard.

- Teams-Games-Tournament (TGT):
  In TGT, students also formed heterogeneous teams of 3-6 members. A team will study learning materials provided by the teacher together. After completing the assignments of each unit, students will play academic games against members of the same ability level from other teams. Players get the same points as long as they answer the questions correctly, regardless of their levels. Individual points are then added up to give the total score of each team. The team with the highest score will be rewarded. The rules of the TGT games can be discussed and determined by teachers and students together. This model is intended to substitute tests with academic games,
and replace student progress scores with performance levels. It is applicable to all subjects.

(II) Learning Together (LT)

LT was developed by David and Roger Johnson in 1975. This teaching design focused on the "creation of a cooperative learning environment" and the "establishment of interdependence among team members". Its main focuses include:

1. Arrangement of works suitable for teams;
2. Guidance for students on cooperation skills;
3. Establishment of an incentive system;
4. Cultivation of the concept of sharing; and
5. Assignment of student roles.

(III) Group Investigation (GI)

GI was developed by a research centre led by the Israeli scholars Shlomo and Yael Sharan. This design is student-oriented, putting emphasis on students' self-adjustment of learning activities. It also focuses on the provision of a wide range of learning experiences. The main teaching process under GI is:

1. Identify the research topic and organise students into small groups;
2. Decide on the research methodology and the division of work for each team;
3. Carry out investigation and discussion within each team;
4. Report on the preliminary results;
5. Present the final results to the class; and
6. Discuss and evaluate jointly by teachers and students.

(IV) Jigsaw

The Jigsaw approach was developed by Professor Aronson et al. in 1971 to enhance the effectiveness of cooperative learning (Colosi & Zales, 1998) by having each student responsible for teaching something to his/her team members. Each member is in charge of learning certain part of the teaching materials. The students are then reassigned into "expert groups" according to the contents. After they have discussed the relevant information within such "expert groups", students go back to their original teams and present the parts they have learnt to the other members.
Appendix IV

Real-life Learning Scenario I

Renewable Energy （for use in Geography）

In Hong Kong, energy demand has been growing rapidly with economic development. As there is no coal, crude oil, or other natural energy reserves, Hong Kong has been relying mainly on imported fossil fuels to meet its energy demand. The government has put in considerable efforts to promote the use of renewable energy in order to maintain sustainable development. What combinations of renewable energy technologies do you think Hong Kong should use? Which kind of renewable energy technology has the biggest potential for development in Hong Kong?

Pre-lesson Preparation:
1. What types of renewable energy technologies do you know? Try to collect information about renewable energy technologies from books or websites, and fill out the following table.

<table>
<thead>
<tr>
<th>Renewable Energy Technology</th>
<th>Pros</th>
<th>Cons</th>
<th>Suitable for HK? Why?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Choose ONE type of renewable energy technology that you think has the biggest potential for development in Hong Kong. Collect relevant information about it and discuss about it in class.

(Because the learning objectives are mainly about training collaborative skills and not about content knowledge, teachers may want to divide students into heterogeneous groups for class discussion. In that case, teachers can assign students to be responsible for some particular types of renewable energy technology).

Class Activity 1a (Homogeneous groups):

Form groups of 4-5 students who hold similar stances. Then share the information you have collected, and discuss why you think that particular type of renewable energy technology has the biggest potential for development in Hong Kong.

(Time for discussion: 20 min. Pay attention to how you and your teammates perform.)

Renewable Energy Technology : ____________________

1. Why is it suitable for use in Hong Kong? (Consider geographical, economic, technological factors, etc.)

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

2. What are its shortcomings?

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

192
3. How to minimize those shortcomings so that this technology can be used most beneficially in Hong Kong?

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

Class Activity 1b (Heterogeneous groups):

Reshuffle the groups into several heterogeneous groups of 4-5 students. There must be at least two different stances in each group (e.g., one supports solar energy and the other wind). Try to reach a consensus regarding “The most promising renewable energy technology for Hong Kong”. Try to convince teammates who hold a different position from yours.

(Time for discussion: 20 min. Pay attention to how you and your teammates perform.)

1. The other side’s position:

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

2. What are the shortcomings of the renewable energy technology proposed by the other side?

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________
3. How can you convince the other side to accept your proposal?

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

4. Has the other side changed position at the end?

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

5. Your group's conclusion:

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
Katherine finds Fannie often looks unhappy and dispirited in school these days. She also notices Fannie has more absences than before. During a chat, Fannie tells Katherine that she has great stress in studying. She says she worked hard but still did badly in exams. Other students often laugh at her, calling her "fat and stupid," “just like a pig.” She is very upset. Her parents think she did badly in exams because she did not work hard. So they often chide her. Fannie thinks nobody understands her. She feels helpless. She also believes that she is worthless, has no future and no meaning in life. Discuss in groups how we can help Fannie.
A. Discuss Fannie's situation. Answer guiding questions 1 to 3. Identify the core problems she encounters.

Q1: What issues does Fannie have recently?

- She has great stress in studying;
- She is derided by other students as being "fat and stupid";
- She is chided by her parents as "not working hard".

Q2: How does Fannie respond to the above issues?

- Emotionally: She is often unhappy and dispirited;
- Behaviourally: She has more absences than before;
- Mentally: She believes that she is worthless, has no future and no meaning in life.

Q3: What is the core problem for those issues? (Try to answer the question with appropriate cognitive tools)

Core problem: Poor academic performance

B. Discuss solutions to help Fannie.

Suppose a local magnate makes a generous donation to your school. Your team can use $50,000 to help Fannie and other students in similar circumstances. Try to collaborate with other team members to think of ways to use the money effectively.

Teachers can use the reference materials on page 202 to stimulate students’ thinking. Teachers may ask each student to handle one material (perspective) only, so that they will be more likely to engage in collaboration.

The following table may help students organise the options from which they can choose a solution (not required to fill out all boxes):
<table>
<thead>
<tr>
<th>Cause of poor academic performance</th>
<th>Solution</th>
<th>Principles to consider when choosing a solution</th>
<th>Mark a feasible solution with &quot;✓&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal factors</td>
<td></td>
<td>Are existing resources adequate? (e.g., time and money)</td>
<td></td>
</tr>
<tr>
<td>Personal interest</td>
<td></td>
<td>Does it benefit many people?</td>
<td></td>
</tr>
<tr>
<td>Learning ability</td>
<td></td>
<td>Is it sustainable?</td>
<td></td>
</tr>
<tr>
<td>Learning style</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Definition of success</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pop culture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family background</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial capacity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education level of family members</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment method</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catering for learner diversity</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
C. Evaluate solutions.

**Step 1:** Discuss the elements of a "best" solution.

Any reasonable answers are acceptable. Advise the students to consider cost-effectiveness, risk assessment and ethical concerns.

**Step 2:** Discuss the final solution.

Value Matrix
D. Discuss the steps and the division of work for implementing the solution.

<table>
<thead>
<tr>
<th>Step</th>
<th>Details</th>
<th>Time</th>
<th>Student-in-charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resources needed</th>
<th>Student-in-charge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
E. Conduct self-evaluation and reflection on the whole problem solving process.

- In the group activity, students may adopt "self-evaluation" to monitor their own performance and make self-regulation, increasing the effectiveness of learning.

**Guidelines on self-evaluation**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Did I take part in the group activity?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Did I understand the content of the activity?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Did I understand my role?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Did I perform my role properly?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Did I take the initiative to provide constructive feedback?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Did I complete the assigned tasks?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Did I contribute to creating a harmonious atmosphere within the team?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Did I encourage my team members and inspire them to work together for the goals?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Did I monitor the progress and effectiveness of the team?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What I can improve:

- Teachers may also ask students to reflect on their performance together after the group activity for improvement.

**Guidelines on group evaluation**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. We completed the tasks within the time allowed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. We had a division of work.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. We assigned tasks according to members' abilities.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. We listened to different views of members.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. We encouraged and helped each other.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. The atmosphere within our team was harmonious.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. We respected each other and handled disagreement in a friendly manner.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What we can improve:
Teachers may also direct students to reflect on the following questions:

When you collaborated with your team members to solve the problem for Fannie, did you:

- help select the problem solving strategies and prepare backup plans?
- help monitor and evaluate the effectiveness of individuals and the team?
- manage to express your views in a clear and organised way?
- take the initiative to introduce new resources and explore new ideas to help keep the team going?
- manage to discuss with other team members on any disagreement in a friendly manner and seek consensus?
- contribute to promoting the cooperative atmosphere within the team and help resolve any conflict?
- value teamwork and motivate other team members to work together for the goals?
- manage to respect and support each other in face of difficult situations and people?
- take the initiative to propose a solution, or adjust the plans or roles as necessary?
<table>
<thead>
<tr>
<th>Perspective</th>
<th>References</th>
</tr>
</thead>
</table>
| 1 Personal factors          | Reference 1: 學友社，《規劃人生由自己出發》。(This source is in Chinese only) http://student.hk/site/?q=article/681  
                          Focus: The importance of personal orientation.  
                          Reference 2: 香港教育城，《成績與自信心的關係》。(This source is in Chinese only) http://www2.hkedcity.net/sch_files/a/129886/strategies_for_enhancing_motivation.htm#p6  
                          Focus: The impact of interpersonal relationship and self-confidence on academic performance.                                                                                       |
| 2 Social factors            | Reference 1: 香港文匯報(2016年9月25日)。《中學生抗逆近半「頂硬上」》(This source is in Chinese only) http://paper.wenweipo.com/2016/09/25/YO1609250008.htm  
                          Focus: Main causes of disturbance of Hong Kong students in face of adversity.  
                          Reference 2: Hong Kong Education Bureau. "Distribution of Educational Attainment of Population Aged 15 and Over".  
                          Focus: Trend of changes in average academic attainment in Hong Kong.                                                                                     |
| 3 Family background         | Reference 1: The University of Hong Kong "Progress in International Reading Literacy Study (PIRLS) 2011 - International Report: Hong Kong Section".  
                          Reference 2: Hong Kong Department of Health. "How to Help Your Child in Studying".  
                          Focus: The impact of parents on their children's school performance.                                                                                     |
| 4 School support            | Reference 1: Hong Kong Education Bureau. Life Planning Page.  
                          Focus: Multiple pathways for secondary school students.  
                          Reference 2: 香港經濟日報（2015年10月18日）。《家長選科擇業要話事 學校輔導》。(This source is in Chinese only)  
                          http://topick.hket.com/article/900519%e5%ae%b6%e9%95%b7%e9%81%b8%e7%A7%91%e6%93%87%e6%a5%ad%e8%a6%81%e8%99%b1%e4%ba%8b%20%e5%ad%b8%e6%a0%a1%e8%bc%94%e5%b0%8e  
                          Focus: Schools' communication with parents and students.                                                                                               |
Teacher's feedback and suggestions

The guidelines on teacher's evaluation provide feedback on student's performance from three perspectives, i.e., problem solving skills, communication skills and collaboration skills. Student's performance is divided into three stages: beginning, developing and mastering. Teachers may put a "✓" in the appropriate boxes according to students' performances. Teachers may also stipulate additional criteria as necessary.

<table>
<thead>
<tr>
<th></th>
<th>Beginning</th>
<th>Developing</th>
<th>Mastering</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collaboration</strong></td>
<td>□ Responds positively and is willing to work with other team members toward the goals</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Follows the rules and instructions for group tasks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Is willing to participate, makes contribution and helps the team achieve the goals</td>
<td>□ Understands the views of other team members on the problem and builds consensus</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Identifies and makes use of the capabilities and potentials of every team members</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Is able to cooperate with different people, and accepts adjustments of plans or roles as necessary</td>
<td></td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td>□ Interprets messages in an open-minded manner, and clarifies the issues and team goals by means of questioning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Expresses personal views to team members clearly in verbal or non-verbal ways</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Shares innovative or unique ideas</td>
<td>□ Raises constructive questions and clarifies visions, goals and perspectives for the sake of a better solution</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Makes specific response to the questions generated in the problem solving process</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Communicates in a respectful and effective manner to enhance mutual understanding</td>
<td></td>
</tr>
<tr>
<td><strong>Problem solving</strong></td>
<td>□ Puts forward a number of solutions and strategies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Completes one’s own tasks in the team</td>
<td>□ Selects the problem solving strategies and develops an action plan</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Takes actions as per the assigned role and makes adjustments as necessary</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Helps select the problem solving strategies and prepares backup plans</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Helps monitor and evaluate the effectiveness of individuals and the team</td>
<td></td>
</tr>
</tbody>
</table>

Comments:

_________________________________________________________________________________
_________________________________________________________________________________
The tourism industry is an important pillar of the economy of Hong Kong. According to government statistics, Hong Kong received 59.3 million visitors in 2015, down by 2.5% from 2014. Some people think that the trend is alarming.

Collect information on Hong Kong's tourism industry in recent years. Analyse the factors affecting visitor arrivals. What can be done to solve this problem? Use holistic thinking skills to complete the above tasks.

Class activity (1):

1. Find out the number of visitor arrivals to Hong Kong in 2011-2015. Describe the trend in recent years with graphs and texts.
Class activity (2):

Apply holistic thinking to analyse the reasons for the decline of visitor arrivals. Propose some innovative and feasible solutions.

<Step 1: Identify / define the problem>
Visitor arrivals to Hong Kong in 2015 dropped 2.5% comparing to 2014.

<Step 2: Analyse possible causes>

<table>
<thead>
<tr>
<th>Causes</th>
<th>Solution</th>
</tr>
</thead>
</table>
| 1. Exchange rates: The Hong Kong dollar is strong, resulting in an increase in the cost of visiting Hong Kong. | Option 1: Provide ticket discounts or package offers for tourist attractions  
|                                                                       | Option 2: Provide hotel deals                                              |
| 2. There are not many sightseeing activities in Hong Kong. Visitors who have been to Hong Kong may not consider revisits. | Option 3: Organise annual mega events (arts festivals, equestrian shows, rugby competitions, Lunar New Year celebrations, etc.)  
|                                                                       | Option 4: Develop night markets for the sale of Hong Kong local specialties |
| 3. The local tourism industry relies heavily on Mainland visitors. The Mainland is seeing an economic slowdown and cracking down on junkets. The number of inbound tourists has therefore dropped. | Option 5: Explore other sources of visitors  
|                                                                       | Option 6: Develop constructive tourism models such as education tourism and |

This exercise focuses on students' holistic thinking skills. The teacher may adjust the depth of the topic according to the teaching objectives.
4. Hong Kong is reputed as a "shopping paradise" but lacks diversified tourist attractions. It is difficult to appeal to non-shopping-oriented tourists.

Option 7: Develop and promote new tourist attractions and elements. (geological, historical, in-depth cultural tours, etc.)

Option 8: Promote cultures with local characteristics for overseas visitors to experience Asian cultures. (Hong Kong street performances, Cantonese opera, New Territories cultural tours, etc.)

Option 9: Strengthen the promotion of Hong Kong as a diversified tourism destination by means of media programmes, turning Hong Kong around from the perception of "shopping only".

<Step 4: Evaluate each solution>

Indicate the above solutions in the value matrix below.
<Step 5: Select the best solution>

Select a solution which you think is the best at this stage. Explain your choice from the perspectives of cost-effectiveness, risk assessment and ethical concerns (for ethical concerns: Do you think the solution can benefit many people? Does it show respect for others / life / nature? Is it fair and just?).

<Step 6: Implement the solution>

Not necessary for the moment

<Step 7: Evaluate and reflect>

Not necessary for the moment
**Is it good to import foreign labour? -- Catering Industry**

Background: The local birth rate is low and the working population will gradually decline after peaking in 2018.

There are more than 200,000 people working in the catering industry in Hong Kong. But there is still an overall shortage of 20-30% overall, especially dishwashers, cleaners, pantry helpers and kitchen helpers.

Now people are very "picky" in finding jobs. It is common that people are recruited but do not show up for work. Some people do report to work on the first day but they exclaim over the large number of customers after taking a look at the dining space and then turned away, not even yet putting on their working uniform.

Restaurant owners have to use money to retain their staff. The monthly salary of a dishwasher has already passed $12,000.

Many people in the industry think it is necessary to import foreign labour. However, even if the government allows it, there will be many difficulties in the implementation. Do you go to Bangladesh or Sri Lanka for foreign labour? Foreign workers coming to Hong Kong will face language and cultural obstacles. It takes time to train them. Companies also need to arrange accommodation for them. Having such concerns, we may instead take a gradual approach, importing foreign labour firstly in the sectors of construction and elderly care. It may help alleviate the recruitment difficulty of the catering industry.

Simon Wong, Chairman of the Institution of Dining Art, one of the four major restaurant trade associations in Hong Kong

We have adopted electronic menus and have saved more than 10% of manpower. But my employees still say that they are short of hands. The receptionists sometimes also need to show customers to their seats and serve dishes.

I have opened seven shops in Singapore and recruited many foreign workers there. I suggest the Hong Kong government follow the practice of Singapore.

The Singaporean government stipulated that the ratio between Singaporean and Malaysian employees should not be lower than 5.5:4.5. And the ratio between Singaporean and Chinese employees should be 10:1. The minimum wage in Singapore is about $7,000 to $8,000 a month. Taking our company as an example, outstanding foreign workers can earn more than $10,000 a month. The HKSAR government can set the minimum ratio between local and foreign workers at 10:2 to protect the employment opportunities of local workers.

Ricky, owner of chain sushi shops
The Hong Kong General Chamber of Commerce (HKGCC) says the problem of manpower shortage is especially severe in sectors such as retail, catering and hotel. But it never says how wages in those sectors have virtually remained unchanged for many years, after taking inflation into account (see Figure 1). With such a lack of pay rise, it is certainly difficult to attract new blood. In contrast, sectors with better growth in salary have relatively fewer vacancies (see Figure 2). On the other hand, there are over 500,000 working women in Hong Kong, while the government's childcare services are critically insufficient. Many women cannot enter the labour market because they need to take care of their families. The HKGCC's claim of labour shortage is completely phoney.

Union leader
Read the materials in groups and discuss the following questions:

1. **What is the core issue? (5 min.)**

   After reading the materials carefully, each student writes down the "core issue" on a small piece of paper and then shares the answers. If their answers are not the same, they should have a discussion within the group and reach a consensus.

   *(How can we address the labour shortage problem in Hong Kong?)*

2. **Is the issue clear enough and in no need of further consideration? (5 min.)**

   Ask students not to accept the so-called consensus too quickly. Encourage the students who read the union's views to put forward different opinions.

   *(Is the labour force really insufficient? Or is there any manpower yet to be released?)*

3. **Is it necessary to clarify anything in the background information? (10 min.)**

   Ask students to see if the views of different stakeholders are supported by sufficient evidence. Are these "facts" really authentic and trustworthy? Do the stakeholders selectively use the information or deliberately ignore any disadvantageous information?

   *(For example: Does anyone over-amplify an individual example? Are the statistics mentioned in the materials comprehensive? Are the sources credible?)*

4. **What are the causes of the problem? (10 min.)**

   Use the fishbone diagram to trace the reasons why it is difficult for the catering industry to hire employees.

   *Give hints to students as necessary, e.g., wages / demographic structure / social support*

   *Cognitive tool: fishbone diagram*
5. Why are the current practices not good enough? Is there any innovative and widely acceptable solution? (15 min.)

Ask students to look for the current practices from the materials: Importation of foreign workers of other sectors (to free up the manpower), use of technology, and increase of childcare facilities.

Based on the hints on page 53-55 in Chapter 2, ask students to use their creativity and come up with solutions for the recruitment difficulty of the catering industry.

6. What are the cost-effectiveness and risk level of each solution? Is it ethical? (15 min.)

We can examine the pros and cons of the solutions from three perspectives:
(1) Cost-effectiveness; (2) risk assessment; and (3) ethical consideration.
<table>
<thead>
<tr>
<th>Solution</th>
<th>Cost-effectiveness: The proportion of returns to costs (Low / Medium / High)</th>
<th>Risk assessment: The potential risk level involved in the solution (Low / Medium / High)</th>
<th>Ethical consideration: Can it benefit many people? Does it show respect for others / life / nature? Is it fair and just? (Yes / No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: Entice employees to work up to 15 hours a day by offering a huge sum.</td>
<td>Example: Medium, because the hourly wage of working overtime is higher than working in normal hours, but it is always lower than the cost of providing accommodation for foreign workers.</td>
<td>Example: High, because working overtime for a long period may easily lead to accidents.</td>
<td>Example: Unethical, because employees' safety and family life are neglected in exchange for profits.</td>
</tr>
</tbody>
</table>
Select the best solution

<table>
<thead>
<tr>
<th>Effectiveness</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

Cognitive tool: Value matrix

Ask students to evaluate the solutions with the above matrix. Then ask if they think the best solution is ethically acceptable? (For example: Can it benefit many people? Does it show respect for others / life / nature? Is it fair and just?)

7. How can we optimise the implementation / adjust the goals? (20 min.)

Guide students to evaluate the suggestions made by other groups and put forward an optimised implementation plan, such as how to prevent abuses or how to address any new problem that may arise.

Materials adapted from:

香港電台公共事務專頁 (Source in Chinese only)

香港職工會聯盟網頁 輸入外勞的真真假假(Source in Chinese only)

**Chinese History**

*This part is provided in Chinese version only.*
History

Topic of Enquiry: Could World War II have been avoided?

I. Warm-up

Throughout history, mankind has fought wars due to conflicts and suffered heavy casualties. Do we have options other than wars? The following incident happened in Europe in the first half of the 20th century. It shows how conflicts can be resolved by means other than wars.

Background

In 1923, the Italian leader Benito Mussolini invaded the Greek island of Corfu under the excuse that some Italian soldiers had been killed. Subsequently the League of Nations (the "LN") formed a commission to investigate the incident. In order to avoid the outbreak of war between the two countries, the LN suggested Greece to pay 50 million lire (the currency of Italy) in indemnity to Italy. As a result, Italy agreed to retreat its troops from Corfu. The two countries eventually avoided war.

<table>
<thead>
<tr>
<th>Country / organisation involved</th>
<th>Expectation</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>To occupy Corfu</td>
<td>Sent troops to invade the Greek island of Corfu</td>
</tr>
<tr>
<td>Greece</td>
<td>To have Italian troops retreated from Corfu</td>
<td>Paid an indemnity of 50 million lire</td>
</tr>
<tr>
<td>The LN</td>
<td>To avoid military conflicts between the two countries</td>
<td>Suggested Greece pay an indemnity to Italy</td>
</tr>
</tbody>
</table>

II. Topic for enquiry: Could World War II have been avoided?

The Second World War broke out in September 1939. It was a large-scale war in human history and had a far-reaching impact on the world. The above example shows that the use of force is not the only solution to conflicts. We may instead calmly think
about the problem we are facing, then analyse the causes and weigh the situation, finally making the most sensible decision. In this lesson, we will try putting ourselves in the historical context. By applying the "7-step-approach to problem solving", let's think about "Could World War II have been avoided?" This exercise will help hone our thinking skills.

7-step-approach to problem solving
Step 1:
Identify / define the problem

1. On 1 September 1939, the German army marched into Poland and the Second World War broke out. According to the topic for enquiry, we can identify the problem as: Could World War II have been avoided?

7-step-approach to problem solving
Step 2: (Questions 2 to 8)
Analyse possible causes of the problem

2. Source A: The following cartoon reflects the financial problem faced by Germany after 1919.
   Please answer the questions according to the cartoon.

   a. Specify the countries or things represented in the cartoon.

   Note: The words in the cartoon are "GERMANY" and "UNLIMITED INDEMNITY"
b. Do you think the Germans were satisfied with the Treaty referred to in the cartoon? Explain your answer based on the cartoon and your knowledge.

They were not satisfied. According to the Treaty of Versailles signed in 1919, Germany was required to pay 6.6 billion pounds in reparations to the victorious countries. It was an astronomical figure and a huge burden for Germany as a defeated country. The Germans felt dissatisfied with the provisions on war indemnity in the Treaty.

c. What would you feel if you were the German at that time?

Angry / Trying to overturn it.

3. Source B: The following speech reflects the views of a European leader on the situation of his country after the First World War.

Please answer the questions according to the Source.

<table>
<thead>
<tr>
<th>Horse</th>
<th>Haystack</th>
<th>Two men on the right</th>
<th>The horse failing to touch the ground</th>
<th>Treaty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>War indemnity</td>
<td>Britain and France</td>
<td>Indemnity and withdrawal</td>
<td>The Treaty of Versailles</td>
</tr>
</tbody>
</table>

We had 650,000 deaths and up to 947,000 injuries in the First World War, in exchange for two worthless lands and tens of thousands of unemployed people. Moreover, our country is under the threat of Communism, which we do not want to see. My compatriots, I hereby promise that I will revive the glory of our nation and recover our losses! I will let you see the prosperity of Europe will start here in Rome.

a. In your opinion, (i) the above speech was mostly likely made by the leader of which European country? (ii) What is his name?

(i) Italy (ii) Mussolini

b. To your knowledge, what did he do to address the problem?

Mussolini recruited retired soldiers to form the National Facist Party, lifting them from unemployment and mobilising them for his seizure of power and his fight against the Communists. As a result, he won great support from the business and the military circles.
4. Source C: The following figure shows the relationship between the USA and some countries in the late 1920s. Answer the questions according to the Source.

a. Why would the United States recover arrears from other countries?
   The USA was suffering from the Great Depression following the Wall Street Crash of 1929.

b. Based on Source C and your knowledge, which country was the most affected one in the incident? Why?
   Germany. The USA had an economic boom after the First World War. Many European countries borrowed from the United States. Germany needed to rebuild its economy on the one hand, and to pay reparations to victorious countries on the other. It was therefore particularly dependent on US loans. The USA demanded loan repayments from its debtors because of the Great Depression in 1929. Those indebted countries, on their part, forced Germany to make reparation repayments according to the Treaty. Germany not only suffered from economic downturn due to the Great Depression but also had to make repayments. Therefore it was the most affected country in the incident.
c. If you were the German at that time, how would you deal with the requests for repayment?

(Free answers) Example: We would be unable to repay the money and had to ask for deferment, or we would just make a default.

5. Source D: The following picture shows the four promises made by Adolf Hitler.
Answer the questions according to the Source.

I promise that Communism will not be able to gain a foothold in Germany!
I will bring glory to the country and build a stronger Germany!
I shall abolish the Treaty of Versailles!
I will create jobs for everyone and bring you better social welfare!

a. How did Hitler's promises reflect the wishes of the German people?
Hitler catered to different needs and aspirations. After the First World War, Germany was forced to accept the Treaty of Versailles. The domestic economy was sluggish and the unemployment rate was high. The country was also facing the threat of Communism. People were generally dissatisfied with the Weimar Republic. They looked forward to a strong and powerful regime which could lead Germany out of the predicament. And Hitler's promises exactly catered to those different needs.

6. Source E: The following passage is taken from a memorial submitted by Tanaka Giichi, Japanese Prime Minister in the 1920s, to the then Emperor.
Answer the questions according to the Source.

But in order to conquer China we must first conquer Manchuria and Mongolia. In order to conquer the world, we must first conquer China. If we succeed in conquering China the rest of the Asiatic countries and the South Sea countries will fear us and surrender to us. Then the world will realise that Eastern Asia is ours and will not dare to violate our rights. This is the plan left to us by Emperor Meiji, the success of which is essential to our national existence.
a. Based on the above text, what prompted Japan to wage war?

As can be seen from the memorial, Japan had the ambition to conquer East Asia. It believed that if it successfully conquered China, the other East Asian countries would surrender and it could show to the world that East Asia was belonged to Japan. Therefore, Japan intended to launch a war against China.

7. Source F: The following passage shows Neville Chamberlain's view of the Munich Agreement. Answer the questions according to the Source.

Neville Chamberlain, the British Prime Minister, was received by Adolf Hitler, the German leader, two nights before the signing of the Munich Agreement. Hitler vowed to Chamberlain that Czech would be Germany's last ambition and he cared nothing else. Chamberlain believed in Hitler's promise. He thought it would maintain peace in Europe and use Germany to suppress the Soviet Union.

a. According to Source F, why would Britain sign the Munich Agreement?

Chamberlain, the British Prime Minister, believed that signing the Munich Agreement would serve two purposes. On the one hand, it would help maintain peace in Europe and avoid war. On the other hand, Britain could make use of Germany to contain the Soviet Union and prevent the spread of Communism.

b. Do you agree with Chamberlain's decision to sacrifice Czech in exchange of peace?

Yes / No.

8. Consolidate the sources (A to F) and the answers of Questions 2 to 7. Fill out the causes of the Second World War in the following chart:
Tool (A): Concept map
(Expected answers)

The rise of Italian fascism

The unfairness of the Treaty of Versailles

Appeasement policy

The rise of Hitler

Causes of WWII

The Great Depression in the USA

Japanese militarism

Appeasement policy

Germany

Nazism

The Treaty of Versailles

The outbreak of war

The Great Depression in the USA

Japanese militarism

Tool (B): Cause-effect fishbone diagram

(Expected answers)

7-step-approach to problem solving

Step 3: (Question 9)

Develop alternative solutions
9. For Step 3, discuss in groups the ways to avoid the outbreak of the war.

Please record the results of the discussion in the table.

Tool (C): Table

<table>
<thead>
<tr>
<th>Cause of the problem</th>
<th>Feasible solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: Appeasement policy</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10. Evaluate and rate the above solutions from the three perspectives of cost effectiveness, risk assessment and ethical consideration.

<table>
<thead>
<tr>
<th>Solution</th>
<th>Cost-effectiveness (Low, medium, high)</th>
<th>Risk assessment (Low, medium, high)</th>
<th>Ethical consideration (Ethical, not ethical)</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: Option (1) To assassinate Hitler</td>
<td>Low (The casualties would be low compared to a war, with the martyrdom of the assassin(s) at most.)</td>
<td>High (The consequences of assassination are uncertain and unpredictable. For example, the Assassination at Sarajevo led to the outbreak of)</td>
<td>Ethical (Killing one person could save tens of millions of lives) / Not ethical (Assassination itself is immoral)</td>
<td>3</td>
</tr>
</tbody>
</table>
11. Consolidate the above solutions and use the following value matrix to choose the best one.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7-step-approach to problem solving

**Step 5**: (Question 11)
Select the best solution
12. Extended question (homework): In 1945, the USA dropped atomic bombs in the Japanese cities of Hiroshima and Nagasaki. Was it the most desirable way to end the war?
**Geography**

The Potential Development Area (PDA) of Yuen Long South is located to the south of Yuen Long New Town, and largely bounded by Yuen Long Highway and Tai Lam Country Park. The PDA is mainly occupied by open storage yards, warehouses and rural industrial workshops, intermingled with rural settlements, residential uses, agricultural land and livestock farms.

Due to the shortage of housing supply in Hong Kong, public views are being sought on the development of the PDA.
The said area is divided into five zones of A, B, C, D and E for the construction of:

1. Storage and Workshop
2. Medium-density private and public housing (for about 20,700 people)
3. Medium to high-density private and public housing (for about 54,400 people)
4. Low-density private housing (for about 7,600 people)
5. Green zone (including farms and rivers)
1. Read the materials first and clarify the problem.
2. How do you think the allocation should be made? What are the considerations in your proposal?

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Circle the zone to be allocated</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Storage and workshop</td>
<td>A / B / C / D / E</td>
<td></td>
</tr>
<tr>
<td>2. Medium-density private and public housing (for about 20,700 people)</td>
<td>A / B / C / D / E</td>
<td></td>
</tr>
<tr>
<td>3. Medium to High-density private and public housing (for about 54,400 people)</td>
<td>A / B / C / D / E</td>
<td></td>
</tr>
<tr>
<td>4. Low-density private housing (for about 7,600 people)</td>
<td>A / B / C / D / E</td>
<td></td>
</tr>
<tr>
<td>5. Green zone (including farms and rivers)</td>
<td>A / B / C / D / E</td>
<td></td>
</tr>
</tbody>
</table>
3. Compare the proposals with your group members. Discuss their differences from the perspectives of cost-effectiveness, stakeholder acceptance and ethical consideration. Then decide which proposal your group will recommend.

![Knowledge review](image)

We can measure the pros and cons of the solutions from three perspectives:
1. Cost-effectiveness;
2. Risk assessment;
3. Ethical consideration.

<table>
<thead>
<tr>
<th>Solution</th>
<th>Cost-effectiveness: The proportion of returns to costs (Low / Medium / High)</th>
<th>Risk assessment: The potential risk level involved in the solution (Low / Medium / High)</th>
<th>Ethical consideration: Can it benefit many people? Does it show respect for others / life / nature? Is it fair and just? (Yes / No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposal by Student A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposal by Student B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposal by Student C</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Some argue that urban development undermines the original countryside and natural landscapes. Discuss in groups how the two can be integrated. (Refer to "creative thinking" on P. 43-56 of Chapter 2)

5. In order to make the solution successful, what other complementary / compensatory measures can the government and the public take?
Religious Education

Discuss the behaviours of the priest, the Levite and the Samaritan in the Parable of the Good Samaritan by employing holistic thinking skills.

Luke 10: 25-37 records a famous story called the Parable of the Good Samaritan. In the story, a man was attacked by robbers and stripped of his clothes. He then passed out in the wilderness. Many people passed by but did not lend a helping hand, based on various considerations. The victim was injured and felt cold without his clothes. He would die if no one saved him. Then a good Samaritan passed by. With his kindness and wisdom, he managed to take the victim to an inn.

Class activity:
- Understand the character backgrounds of the priest, the Levite and the Samaritan in the Bible.
- Understand the story of the good Samaritan.
- Apply holistic thinking to analyse and evaluate the behaviours of the priest, the Levite and the Samaritan in the parable.

7-step-approach to problem solving
1. Identify / define the problem
2. Analyse possible causes
3. Develop alternative solutions
4. Evaluate each solution
5. Select the best solution
6. Implement the solution
7. Evaluation and reflect
1. Identify / define the problem

What problems was the robbery victim facing?

*Being robbed and injured; lost properties and warm clothes*

The victim's problems and needs:

<table>
<thead>
<tr>
<th>Injury / body temperature:</th>
<th>Emotion and the will to live:</th>
<th>Environmental danger:</th>
<th>Basic needs for survival and recovery:</th>
</tr>
</thead>
<tbody>
<tr>
<td>He was beaten to half dead and unable to walk. He was likely to be frozen to death with the arrival of the night.</td>
<td>He was likely to lose the will to live because of fear and despair.</td>
<td>Robbers were likely to be still around and beasts were likely to exist nearby.</td>
<td>He was in need of food and accommodation before being able to go home on his own because he was penniless.</td>
</tr>
</tbody>
</table>

Give first aid and apply a simple bandage to stop bleeding; provide clothes to maintain his temperature.  
Offer encouragement and support.  
Provide protection and help move him to a safe place.  
Provide food and a place for recovery.

2. Problem analysis: Some people argue that the priest and the Levite did not save the man because of the reasons in the table below. Is there any evidence in the Source (the Bible) to justify their inaction? Do you think those reasons are valid?
### Table

<table>
<thead>
<tr>
<th>Reason</th>
<th>Evidence mentioned in the Source</th>
<th>Is it justified? Is the difficulty insurmountable?</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Personal journey</td>
<td>Yes: The priest and the Levite chose this faster but dangerous mountain path.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No: 10:31: &quot;A priest happened to be going down the same road...&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Find out the two locations in the Bible Atlas.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>It indicates that the priest was travelling from Jerusalem (the place of his work) to Jericho.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note: Jerusalem is at an altitude of more than 2,300 feet, while the Dead Sea near Jericho is 1,300 feet below sea level.</td>
<td></td>
</tr>
<tr>
<td>(b) Personal safety</td>
<td>They were concerned that the robbers might still be around and attack them when they focused on the rescue.</td>
<td></td>
</tr>
<tr>
<td>(c) Material supplies</td>
<td>The Source does not say whether they had extra livestock or first-aid supplies.</td>
<td></td>
</tr>
<tr>
<td>(d) Others: E.g., personal</td>
<td>Their professions did not</td>
<td></td>
</tr>
</tbody>
</table>
values allow them to touch the blood of the dead. Complying with rituals and legal requirements would be more important than saving lives or making remedies.

3. Figure out solutions for different challenges
See "creative thinking - divergent thinking" in Chapter 2. Think about how we can overcome the difficulties and save the robbery victim.
4. Evaluate each solution

We can measure the pros and cons of the solutions from three perspectives: (1) Cost-effectiveness; (2) risk assessment; and (3) ethical consideration.

<table>
<thead>
<tr>
<th>Solution</th>
<th>Cost-effectiveness (Low / Medium / High)</th>
<th>Risk assessment (Low / Medium / High)</th>
<th>Ethical consideration</th>
<th>Solution to be selected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. Implement the solution

How did the good Samaritan manage to save the man? Did he succeed because he was lucky / blessed by the God, or because he had a careful plan? Think about the details from these two perspectives:

7. Evaluate and reflect

A. How do you think the good Samaritan in the story would reflect on his own identity and racial harmony? (Students already know that Jews discriminated against Samaritans because of their interracial marriages.)

B. What would he do to protect the safety of his own and of others?

C. By looking at the priest, the Levite and the good Samaritan in the story, are belief and values helpful in dealing with a dilemma?
Life Education

Peter is facing a dilemma in subject choice. He is interested in History and Chinese History but his parents believe that Economics and Geography will be more helpful to his future studies and career development. In your opinion, how should he make an ideal decision by using holistic thinking skills?

Knowledge review

1. Identify / define the problem

What problem is Peter facing?

Details of the problem:

<table>
<thead>
<tr>
<th>Preferred subject</th>
<th>Reasons</th>
<th>Underlying belief / values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Ask students to gather information from the following websites to complete the 2nd step <Analyse possible causes>.

|   | Study Paths for S3-S5 School Leavers under the New Academic Structure (NAS)  
https://careerguidance.edb.hkedcity.net/edb/export/sites/default/lifeplanning/.pdf/futher-studies/local/Study-Paths-for-S3-S5-School-Leavers-under-NAS_e.pdf  
*Browsing focus: Pathway after Secondary 3* |
|---|---|
| 2 | Source 1: Study Paths for S6 Graduates under the New Academic Structure (NAS)  
Source 2: Vocational and Professional Education and Training  
*Browsing focus: Pathway after Secondary 6* |
| 3 | Source 1: Mutual Recognition of Academic Degrees in Higher Education in the Mainland and Hong Kong  
Source 2: Scheme for Admission of Hong Kong Students to Mainland Higher Education Institutions 2016/17  
*Browsing focus: Pathways other than local tertiary education after DSE* |
| 4 | List of Senior Secondary Applied Learning Courses (2016-18 Cohort)  
*Browsing focus: Choices other than Senior Secondary academic subjects* |
| 5 | EDB Designated Webpage for 2016/17 Secondary 6 Students  
http://334.edb.hkedcity.net/S6_webpage/EN/jupas.php  
*Browsing focus: Admission requirements of JUPAS participating-institutions* |
2. Analyse possible causes of the problem

<table>
<thead>
<tr>
<th>Topic for enquiry</th>
<th>Relevant information / evidence</th>
<th>Possible causes of related fallacy / belief</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: Are further studies the only way out?</td>
<td>Example: Multiple pathways, such as vocational and professional education and training</td>
<td>Example: Failure to access comprehensive information</td>
</tr>
</tbody>
</table>
3. Develop alternative solutions

<table>
<thead>
<tr>
<th>Possible causes of related fallacy / belief</th>
<th>Feasible solution</th>
<th>Adequacy of existing resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: Failure to access comprehensive information</td>
<td>Example: Search online for the information on further studies</td>
<td>Example: Spare time after school, after work or during holidays</td>
</tr>
</tbody>
</table>

Cognitive tool: Table
Consolidate the answers in the above table with a reverse fishbone diagram.

4. Evaluate each solution

We can measure the pros and cons of the solutions from three perspectives: (1) Cost-effectiveness; (2) risk assessment; and (3) ethical consideration.

<table>
<thead>
<tr>
<th>Solution</th>
<th>Cost-effectiveness (Low / Medium / High)</th>
<th>Risk assessment (Low / Medium / High)</th>
<th>Ethical consideration</th>
<th>Solution to be selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting with teachers of the school's Career Guidance Team (CGT)</td>
<td>High</td>
<td>Low</td>
<td>Do not want to waste the time of CGT teachers</td>
<td></td>
</tr>
</tbody>
</table>
5. Select the best solution

Cognitive tool: Value matrix

High

Value

Low

High

Cost

Low
6. Implement the solution

After meeting with CGT teachers and reading others' life stories, Peter's parents understand that their son can choose applied learning subjects apart from the conventional ones. The fallacy that choosing different subjects would have different impacts on further studies and career development are also clarified.

Encouraged by CGT teachers, Peter also confesses to his parents that he actually wants to choose Automotive Technology of Applied Learning, because he has been being greatly interested in cars since he was a child. And History is just one of many subjects he is relatively interested in.

In the end, Peter and his parents make a compromise with each other. Peter's parents allow him to choose Applied Learning and a history subject but require him to choose Economics (3X) at the same time.

<table>
<thead>
<tr>
<th>Possible new problems</th>
<th>How to reduce potential negative impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Evaluate and reflect

When you were helping Peter solve the problem, did you:

- collect comprehensive information to facilitate analysis?
- consider the perspectives and interests of different stakeholders?
- consider different possibilities and new suggestions?
- consider the short- and long-term influences of the decision and get prepared?
- make any action against social morals or your own core values during the entire problem solving process?
- strike a balance between the ideal and the actual circumstances / existing resources?
<table>
<thead>
<tr>
<th>7-step-approach to problem solving</th>
<th>Learning and teaching activities</th>
<th>Learning and teaching resources</th>
<th>Learning and teaching objectives</th>
<th>Generic skills applied</th>
</tr>
</thead>
</table>
| 1. Identify / define the problem  | • Figure out Peter's problem and the related details by individual thinking / group discussion. Complete page 1 of the Worksheet.  
• Identify and refine Peter's problem by free sharing / group briefing. | Page 1 of Worksheet (p. 237) | ✧ Identify prejudice and clarify fallacy  
✦ Explore other views and perspectives | Critical thinking:  
Enquiry and assessment  
∙ Integrate complementary and contradictory information  
Creativity: Creation of ideas  
∙ Put down pragmatic and rational thinking for the time being to allow the creation of new possibilities |
| 2. Analyse possible causes         | • Explore enquiry points worthy of discussion based on Peter's problem. Complete the "topics for enquiry" on page 2 of the Worksheet.  
• Read the attachment in groups with the approach of "jigsaw reading". Discuss how the relevant information helps resolve each topic for enquiry. Analyse why Peter and his parents have different opinions on subject choice. Complete the parts of "relevant information / evidence" and "possible causes of related fallacy / belief" on page 2 of the Worksheet.  
• Each group gives a brief sharing on how to resolve a topic for enquiry with the information / evidence. | Page 2 of Worksheet (p. 239) | | |
<table>
<thead>
<tr>
<th>7-step-approach to problem solving</th>
<th>Learning and teaching activities</th>
<th>Learning and teaching resources</th>
<th>Learning and teaching objectives</th>
<th>Generic skills applied</th>
</tr>
</thead>
</table>
| 3. Develop alternative solutions  | • Each group is responsible for one "possible cause of related fallacy / belief". Discuss feasible solutions.  
• Each group shares its ideas. Other groups provide feedback on the feasibility and expected effectiveness of the solutions. Complete page 3-4 of the Worksheet (except for the "Solution to be selected"). | Page 3-4 of Worksheet (p. 240-2) Blank paper | Understand "value" and "costs" involve personal values, the understanding of the incidents, personal experiences, etc. And understand that each person has different ideas about what the "best" solution is. | Critical thinking and problem solving:  
Analysis and comparison  
• Compare the possible consequences of each solution based on the prevailing and individual values  
Creativity: Prediction and fine-tuning  
• Predict the negative impacts. Put forward corresponding preventive or remedial measures |
| 4. Evaluate each solution         | • Discuss in groups the solution(s) to be adopted. Have in-depth discussions and determine the "best" solution(s) (no more than three). Complete page 5 of the Worksheet.  
• Individually fill out the "value matrix" on each solution on page 4. Complete page 5 of the Worksheet.  
• Share your insights freely. Analyse the reasons for different "value" and "cost" orientations. | Page 5 of Worksheet (p. 242) | | |
<p>| 5. Select the best solution       | | | | |</p>
<table>
<thead>
<tr>
<th>7-step-approach to problem solving</th>
<th>Learning and teaching activities</th>
<th>Learning and teaching resources</th>
<th>Learning and teaching objectives</th>
<th>Generic skills applied</th>
</tr>
</thead>
</table>
| 6. Implement the solution        | • Based on the lesson time and the proposed solutions, ask the students to write down Peter's final decision or else adopt the reference ending on page 6.  
• Think about and share any possible new problems resulting from Peter's final decision individually or in groups. Identify measures to reduce the potential negative impacts. | Page 6 of Worksheet (p. 243) | Understand how different solutions may result in different developments and consequences. Realise the importance of careful problem analysis. | Problem solving: Implementation and monitoring  
• Monitor the progress using the proposed test points and guidelines |
| 7. Evaluate and reflect          | • Ask the students to reflect on whether they have duly completed each step of problem solving and make an "ideal decision". | Page 6-7 of Worksheet (p. 243) | Understand holistic thinking skills involve critical thinking, creativity, and problem solving skills. And it requires the application of different abilities in an integrative approach and taking appropriate actions. | Critical thinking: Assessment and reflection  
• Predict possible new problems arising from the solution |
Teachers may use the descriptors below for providing feedbacks on students’ holistic thinking skills by putting ticks in boxes below.

Suggested Feedback for Holistic Thinking Skills

<table>
<thead>
<tr>
<th>Critical Thinking: enquiring and assessing</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beginning</strong></td>
<td><strong>Developing</strong></td>
<td><strong>Mastering</strong></td>
</tr>
<tr>
<td>□ ask questions to explore matters that attract interest</td>
<td>□ pose questions to explore issues related to their immediate contexts</td>
<td>□ pose questions that probe complex and abstract ideas about issues beyond local context and contemporary period</td>
</tr>
<tr>
<td>□ identify main ideas and clarify meaning in information</td>
<td>□ comprehend complementary and contradictory information</td>
<td>□ synthesise points from complementary and contradictory information</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Creativity: generating</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beginning</strong></td>
<td><strong>Developing</strong></td>
<td><strong>Mastering</strong></td>
</tr>
<tr>
<td>□ come up with new ideas by linking imagination and reality</td>
<td>□ draw parallels between known and new scenarios and use ideas, patterns and trends to consider new possibilities</td>
<td>□ generate a large number of raw ideas</td>
</tr>
<tr>
<td>□ create analogies by matching two ideas</td>
<td>□ produce alternative or unconventional solutions</td>
<td>□ combine good ideas to make even better ideas</td>
</tr>
<tr>
<td>□ brainstorm suggestions</td>
<td>□ suspend judgement to consider alternative ideas and actions</td>
<td>□ use existing knowledge in a novel way</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ temporarily suspend pragmatic and rational thinking to allow new possibilities to emerge</td>
</tr>
</tbody>
</table>
### Critical Thinking and Problem Solving: analysing and comparing

<table>
<thead>
<tr>
<th>Beginning</th>
<th>Developing</th>
<th>Mastering</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ realise real world constraints in drafting solutions</td>
<td>□ estimate the cost and benefit of possible solutions from multiple perspectives</td>
<td>□ compare the possible outcomes of each solution against both their own and prevailing values</td>
</tr>
<tr>
<td>□ compare advantages and limitations of various solutions</td>
<td>□ rate and select solutions according to criteria, such as feasibility, desirability and ethical considerations</td>
<td>□ mediate opposing viewpoints and acknowledge the limitations of one’s view</td>
</tr>
<tr>
<td></td>
<td>□ compare the possible outcomes of each solution against both their own and prevailing values</td>
<td>□ synthesise different considerations into a solution</td>
</tr>
</tbody>
</table>

### Creativity and Problem Solving: predicting and fine-tuning

<table>
<thead>
<tr>
<th>Beginning</th>
<th>Developing</th>
<th>Mastering</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ ask “what if” questions</td>
<td>□ make adjustments to avoid possible pitfalls (e.g. ambiguity, stereotyping and misunderstandings) in planning and presentation of solutions</td>
<td>□ fine tune plans with reference to new developments</td>
</tr>
<tr>
<td>□ consider ways of tackling possible consequences</td>
<td>□ consider alternative courses of action in changing situations</td>
<td>□ be sensitive to stakeholders’ reactions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ anticipate adverse impacts and suggest precautionary or compensatory measures accordingly</td>
</tr>
</tbody>
</table>
### Problem Solving: executing and monitoring

<table>
<thead>
<tr>
<th>Beginning</th>
<th>Developing</th>
<th>Mastering</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ choose a solution and devise an implementation plan, using support and advice given</td>
<td>☐ execute the plan, monitor progress and revise the strategies when necessary</td>
<td>☐ monitor the progress with established check points or criteria</td>
</tr>
<tr>
<td>☐ turn the plan into workable parts with measures for implementation</td>
<td>☐ realise the adverse effect of over-reacting and using emotional words</td>
<td>☐ suggest ways to catch up with delays or optimise the results</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ manage over-reactions and strong emotions</td>
</tr>
</tbody>
</table>

### Problem Solving and Critical Thinking: evaluating and reflecting

<table>
<thead>
<tr>
<th>Beginning</th>
<th>Developing</th>
<th>Mastering</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ reflect on whether the task is accomplished</td>
<td>☐ evaluate the quality of outcomes and the solution process</td>
<td>☐ evaluate the effectiveness of solutions with due regard for positive values</td>
</tr>
<tr>
<td>☐ be open to comments and feedback</td>
<td>☐ invite and evaluate feedback</td>
<td>☐ anticipate possible problems arising from the solution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ make judicious use of comments and feedback</td>
</tr>
</tbody>
</table>

Feedback:
Religious Education

Study in groups the Miracle of Five Loaves and Two Fish in the four Gospels, with individual student focusing on one gospel version: John 6:1-13, Matthew 14:13-21, Mark 6:30-44 and Luke 9: 10-17.

If time permits, conduct homogeneous grouping first: Assign the students studying the same version of material to one group. Ask them to find out answers of the following questions.

1. What happened?
2. Who are involved?
3. What did they say?
4. What did they do?

The following passages are taken from the Gospel of John (NIV):

<table>
<thead>
<tr>
<th>Verse</th>
<th>Text</th>
</tr>
</thead>
</table>
| 6:1   | Jesus Feeds the Five Thousand  
Some time after this, Jesus crossed to the far shore of the Sea of Galilee (that is, the Sea of Tiberias), |
| 6:2   | and a great crowd of people followed him because they saw the signs he had performed by healing the sick. |
| 6:3   | Then Jesus went up on a mountainside and sat down with his disciples. |
| 6:4   | The Jewish Passover Festival was near. |
| 6:5   | When Jesus looked up and saw a great crowd coming toward him, he said to Philip, "Where shall we buy bread for these people to eat?" |
| 6:6   | He asked this only to test him, for he already had in mind what he was going to do. |
| 6:7   | Philip answered him, "It would take more than half a year’s wages to buy enough bread for each one to have a bite!" |
| 6:8   | Another of his disciples, Andrew, Simon Peter’s brother, spoke up, |
| 6:9   | "Here is a boy with five small barley loaves and two small fish, but how far will they go among so many?" |
| 6:10  | Jesus said, "Have the people sit down." There was plenty of grass in that place, and they sat down (about five thousand men were there). |
| 6:11  | Jesus then took the loaves, gave thanks, and distributed to those who were seated as much as they wanted. He did the same with the fish. |
When they had all had enough to eat, he said to his disciples, “Gather the pieces that are left over. Let nothing be wasted.”

So they gathered them and filled twelve baskets with the pieces of the five barley loaves left over by those who had eaten.

---

**Heterogeneous grouping (with students studying different gospel versions in a group). Discuss:**

1. What problem were the disciples facing?

2. What was the disciples' original suggestion?

3. What advice did Jesus give them?

4. Why did Philip think that Jesus' advice was infeasible?

5. The disciples eventually followed Jesus' instructions and made a contingent arrangement for the crowd to sit down? What was the arrangement? How did it help solve the problem?

6. In 6:11, Jesus took the loaves and gave thanks. What do you think he had said to produce more and more food?

7. The child with five loaves and two fish was a source of new idea. Jesus made good use of this idea. How?

8. How did Jesus change the values of the people, so that they acknowledge commitments and selfless sharing as the key to problem solving?
9. In your opinion, what new understanding did the disciples have on Jesus after the incident? What lessons did they learn in collaborative problem solving? (Refer to the feedback form on collaborative problem solving skills)

10. How well did the team members do in group discussions? Reflect on your performance in the self-evaluation and group evaluation forms.
Teachers may consider making adaptive use of the feedback form on P.133 of Chapter 4 after group activities in PSHE subjects, such as the example below for History.

**Topic 9, The Renaissance in Building Global Perspective – New Resources for 23 Major Topics in World History**

**Task 3: Impact of humanism on architecture**

Group Activity (Please refer to Sources F, G and H)

**Teaching Tips**

Each group is to use a kind of material, such as newspaper, drinking straws and ice-lolly sticks, to build a roofed building within a specific period of time, and then report its difficulties. The teacher may show Source F to let students see how pieces of stone were put together to bridge a wide space. The Romans used arches widely, and turned arches into domes. Then study Source G. It is a picture of the Pantheon in Rome, built in 125 AD, which illustrate how difficult it could be to build this dome. Lastly, show Source H – a beautiful architectural example of Renaissance buildings – St Peter’s Basilica in the Vatican.
Chinese History:

This part is provided in the Chinese version only.
Resource Package on
“The Integrative Use of Generic Skills”
in Junior Secondary Subjects
in Personal, Social and Humanities Education Key Learning Area

Produced by Shiu Ling Po, Fung Man Yuk and Hau Kit Tai
Graphic Design by Kwan Hiu Tung
Published by Personal, Social and Humanities Education Section,
Curriculum Development Institute, Education Bureau 2017
Printed by Asia One Printing Limited

ISBN: 978-988-8370-32-0

Copyright © Education Bureau,
The Government of the Hong Kong Special Administrative Region

Schools or organisations may use any part of the Package they find appropriate
for the purpose of teaching and training of non-profit making nature.
No part of the Package shall be duplicated for commercial purpose.