The Learning & Teaching of Critical Thinking Skills: Scenario Analysis (Senior Secondary)

Produced by Kelly KU, Kit-tai HAU, and Irene T. HO

Personal, Social and Humanities Education Section, Curriculum Development Institute, Education Bureau
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(Translated version)
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The Personal, Social and Humanities Education (PSHE) Section, Curriculum Development Institute, Education Bureau, has issued the Package on “The Learning & Teaching of Critical Thinking Skills” (Senior Secondary) in 2009. It was produced by Dr. Kelly KU, Prof. Kit-tai HAU and Prof. Irene. T. HO. The Package was adapted from Prof. Diane F. HALPERN’s critical thinking teaching package and tailored for the local context. It systematically introduces the basic concepts and strategies of critical thinking, which students can apply and practise in various curricula.

Based on the Package, the PSHE Section commissioned Prof. Kelly KU (Assistant Professor, Department of Education Studies, Hong Kong Baptist University), Prof. Kit-tai HAU (Professor, Department of Educational Psychology, The Chinese University of Hong Kong), and Prof. Irene T. HO (Assistant Professor, Department of Psychology, The University of Hong Kong) to produce this booklet. This booklet will facilitate students’ analyses as well as participation in group discussion and other relevant learning activities through different simulated scenarios. During the process, students can concretely practise the critical thinking skills that they have learnt from the Package as well as to reflect on related values and attitudes. Apart from this, it has provided hints for teachers so that they can guide their students to apply the critical thinking skills, which have been learnt from different scenarios of this booklet, in their discussion of related issues in Liberal Studies.

Prof. HALPERN is the Chair of the Department of Psychology, Claremont McKenna College, U.S.A. and was the former president of the American Psychological Association.
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Scenario 1

The Fate of the Island
Scenario 1
The Fate of the Island

Learning Objectives

This scenario presents an impossible choice: scientific instruments predict a tsunami will soon reach the island. However, according to the local tradition of observing animals to predict natural disasters, there are no signs of an impending disaster.

Scenario Discussion

The discussion should guide students to make a rational and informed decision on whether a full evacuation of the island’s inhabitants is necessary. Students will also be taught about decision-making skills.

1. When making decisions, the crux of the problem must be identified.
2. Distinguish between data, facts, opinions and arguments; use them appropriately when making decisions.
3. Analyse and weight the benefits and drawbacks of different solutions.
4. Understand possible biases.
5. Make a well thought-out decision after considering all factors.

Expansive thinking

Guiding students to utilise decision-making skills to become a smart consumer of medical services.

1. When receiving medical advice from a professional, what attitudes should we have? How can the patient act to make medical advice more reliable?
2. Can medical malpractice be avoided?

Technique Transfer and Application

Guiding class to applying the techniques acquired from the above scenario, to discuss the following Liberal Studies issues:

Module 5: Public Health

- How is people’s understanding of health affected by economic, social and other factors?
- In what ways is people’s understanding of public health affected by health information, social expectations, personal values and beliefs in different cultures?
You live in a backward and remote island nation. For the past a hundred years or so, people on the island are self-sustained, living on farming and herding. Neighbouring the small island is a big, prosperous, and advanced nation. Recently, using their instruments, specialists in that nation detected that within three weeks, the small island will be hit by intense earthquakes. The quakes could last months, generating a tsunami that will drown the entire island.

When the neighbouring nation received the news, they sent a warning to your island. They urged you and your people to leave immediately. The nation also agreed to temporarily accommodate the island’s inhabitants. Your livestock, however, were forbidden to enter. The island government accepted this arrangement and asked its people to take shelter in the neighbouring nation for at least a few months. This was met with strong objection from the local people on the island. They claim for hundreds of years people here had used animal behaviour and weather changes to predict earthquakes, which had always been accurate. They predicted no earthquakes in the region around the island any time soon. They also considered the technology in the neighbouring nation unreliable. Moreover, if they left behind all livestock and farmland for months, everything would have died before the people could come back. The next year’s provisions will be all but gone.
Suggested Activities

A. Discussion

Class or group discussion:

1. What must be done or learnt before the island people decide whether to go or to stay?
2. If you were a government official on the island, would you enforce mandatory evacuation? Why?
3. If you were an island inhabitant, would you choose to leave immediately? Why?

B. Role-play (I)

Class or group discussion

Several actors should be chosen by the class, or the class can be divided into groups of 4 to 6. They are to play the following roles plus note-takers and observers.

1. Island officials: inclined to accept the neighbouring nation’s proposal, hoping to avoid life and property loss in case of a real earthquake. However, the officials have numerous causes for worry including the uncertainty of whether the earthquake will actually happen.
2. Island inhabitants: object to leaving the island which will lead to property loss.
3. Officials in the neighbouring nation: strongly urge island residents to leave.

Remarks:
(a) Please refer to the discussion questions in activity A.
(b) Some roles can be played by more than one person (e.g. more than one resident on the island).
(c) It is suggested that one or more persons holds the job of observer or note-taker, to report or comment on the discussion process.
(d) 1/3 of the total time used in the activity should be reserved for the note-taker or an elected group leader, who has the job of leading discussions regarding the role-play – which arguments that are reasonable and persuasive, which are fallacious thinking.

C. Role-play (II)

Roles should be played by students chosen using the same method in Activity B; students can also be invited to volunteer:

1. Government officials: Despite your support, the people in the island had decided to stay. Since you could not force them to leave their homes, you brought with you only a few inhabitants and left for the neighbouring nation. After 6 months, no earthquakes occurred. However, you returned to the island only to find that the island was beset by numerous safety, livelihood and economic problems from six months of vacuum of governance. How will you respond to the local people’s queries?
D. Situational Drama

Please give students 20 minutes to prepare for a short, 5-minute situational drama.

Guidelines
Suppose you are a member of the island’s state council. You are in the middle of a meeting, discussing how to decide upon a suitable course of action to respond to possible situations. The council’s opinions are divided into two parties: One party scoffs at the neighbouring nation’s predictions and considers it completely unnecessary to panic. They also think that the island would sustain huge economic losses if the people were asked to abandon their homes. The other party is inclined to believe the scientific predictions. They think that the government should accept their neighbour’s proposal to ensure the safety of the inhabitants. In the performance, students can be divided into two groups each playing the role of the two different parties. Students must deliver their ideas in a clear manner, and use facts and evidence to support their argument. After the drama, the class audience will have the opportunity to raise details or possibilities which have not been considered by the performing groups.

2. Island inhabitants: You led the local inhabitants to move against the government’s evacuation plan. Though the government decided to move, you and a small number of residents decided to stay. Two months later, the earthquake happened. Luckily, you survived, but the island’s population sustained heavy losses. How will you respond to the accusations of the victim’s friends and relatives?
Explanation of Scenario

Techniques in making decisions

Students are free to choose if they support or object to leaving the island. There is no definite answer. In this scenario, rather than coming up with an answer (to stay or leave), class should learn of the ways to uncover the answer (how to make an adequate decision).

In daily lives we are often faced with choices. They can be as simple as deciding on an ice-cream flavour, or as complicated as choosing a University major or a suitable job. “Decisions” are everywhere and are intimately connected to our daily lives. As different decisions can bring different consequences, decision-making techniques are a basic aspect of critical thinking.

Whether our decisions are appropriate and rational depends on our applying the critical mind in decision-making. When students read the above scenario, some may quickly come up with an answer in their heads, and decide whether to stay or leave the island. However, has the scenario provided sufficient information to help you make a decision?

Hong Kong’s social environment has, to different extents, inculcated in students the “speed is the edge” mindset – being efficient at work or quick to respond to situations is indeed a positive attribute. In many cases, we do need to deal with situations in a tight time frame. But students should also remember that hasty decisions are not necessarily good ones. A good decision requires time for thought and analysis. For example, have students seen on the news reports of relief work for natural disasters? Should relief workers rush into the site and help the first victim they see? The fact is they do not. Relief workers usually first study the environment, acquire factual knowledge such as the number of victims and the disaster location. They then consider and discuss preparations needed for the relief action. They consider factors like where in the disaster site do victims have the highest possibility of survival, or require shorter time in first aid. Such procedures usually take time, but are necessary. Why are relief workers not allowed to start work immediately? Because through collection of information and data, the crux of the problem can be identified and the benefits and drawbacks of each choice weighed more thoroughly.

With respect to the Scenario 1, students should carefully analyse the facts of the incident before they make a decision. What information has the neighbouring nation’s instruments provided? Will earthquakes and tsunamis certainly happen, or simply highly
probable? Can we learn in greater detail the possibility of earthquakes and tsunamis? What are the ways? Can island residents consult professionals from other countries? Can alternative, independent predictions be made using another nation’s equipments? Perhaps, after collecting comments from different parties, your final choice would be different from your original decision. But this new choice is more reliable, because a thorough consideration and rational analysis have been made. When making decisions, we should not rush into action. We should spend time sourcing information from different parties and approach the truth of the matter. We should only make decisions when certain that we have sufficient information in our hands.

Students can also use this scenario to discuss the relationship between traditional experience and new technologies. What is scientific evidence? Predictions often have errors (they are not 100% accurate). Does this mean that they are not scientific evidence? Both science and traditional experience have their value. Some students may think that traditional experience may be more reliable and sensitive compared to technology. Others may hold the opposite opinion. Science is reliable because scientific theories have undergone rigorous testing and proofing; they have to withstand the test of time. One example is the instruments used in Scenario 1 to predict earthquakes. Scientists must first evaluate the equipment’s accuracy before deploying it. Although there is little chance that the equipment may malfunction, it might still be possible. Traditional experience is also repeatedly tested, such as that when earthquakes or other natural disasters are impending, animals will change their behaviour. This is not a one-time observation, but rather an induction through repeated observation. The process of induction, however, may not be scientific. It might include subjective ideas, misinterpretations, rumours or fallacious inferences. Of course, in a way, scientific and traditional experience can work hand-in-hand to explain natural phenomena – science can often be used to explain phenomena repeatedly observed by traditional experience.
Expansive Thinking
How to be a smart medical consumer?

In daily lives, incidents like the island earthquake scenario are uncommon. But every day we are faced with different choices, both big and small: from choosing a restaurant to choosing a career. Whether the outcome is good or bad very much relates to our decision-making process. This is especially crucial when it comes to important decisions. One example is when we or our close ones are ill; we have to make all kinds of medical decisions. In such situations, we should not simply accept suggestions passively. Being the key stakeholders in medical decisions, we should take a cautious initiative in participating in the decision-making process.

With today’s technological advancements and developments in medical equipment and pharmaceutical technology, doctors are often able to accurately diagnose and treat patients. But incidents of medical malpractice are still commonplace in the news. Many factors lead to medical errors, such as the functioning of the medical system, the operation of medical equipment, the professional standards of medical staff and so on. While we have no control over many of these factors, when we decide on an operation, switch medications, or participate in experimental therapy, are we bound to remain passive and rely on sheer luck that medical malpractice does not happen? Class should think about how the average citizen can evaluate whether s/he has enough information to make an adequate medical decision.

Look at the two real-life examples:

In September 2008, a serious incident involving medical malpractice happened in one of Hong Kong’s public hospitals. A female patient, who developed a benign breast tumour, had her tissue sample confused by the hospital. She was later misdiagnosed with a malignant tumour, and consequently had her whole left breast surgically removed. The mistake was not discovered by the hospital until after the surgery. The patient, however, has already suffered irreversible physical and emotional scars.

In the same month, another female patient died of cirrhosis in another public hospital. She developed cirrhosis symptoms two years ago: pale, yellowish eyes and pain in her upper-right stomach. Owing to the seriousness of her condition, her attending physician advised her to receive a liver transplant. However, when she completed the pre-surgical check-up, the specialist in charge told her that no transplant was required and discharged her that day. In early September 2008, she was readmitted due to the worsening of her situation. It was until then that she was arranged another liver transplant. However it was too late even when a friend of hers was willing to donate a liver. She died ten days later.
Bias – Role-conferred advantage/disadvantage

An average person usually does not possess professional medical knowledge. Therefore, when making medical-related decisions, s/he tends to rely completely on the doctor’s diagnosis. This is actually a bias – we rely completely on doctors because of the assumption that we lack knowledge in the field. This kind of error leads to a role-conferred advantage/disadvantage. To put it simply, the differences in role (doctor and patient) lead to an asymmetry of information, meaning that certain information is exclusive to the doctor. As a result, the doctor has certain advantages over the patient, who stands in a weaker position. But are we to stay on the weak side, having no choice but to passively accept every suggestion the doctor offers? Is there any way in which we can acquire the information that doctors have? Is there anything we can do to lower the risk of medical malpractice?

Even if the average citizen does not have professional medical knowledge, there are still many things we can do to improve the reliability of our medical decisions. First, we can seek advice from other people besides our attending physician. We can also collect data to cross-check with the information on hand. We could consult another doctor, or even several other doctors, and compare their advice. Then, analysing all available information, we could decide on the most suitable method of treatment. Secondly, we can consult existing or recovering patients having the same illness. Their experience constitutes reliable and useful information. Thirdly, we can look for relevant knowledge in medical books or literature. This can help us make decisions through comparing objective scientific knowledge against our own health conditions, further lowering the chances of misdiagnosis and medical malpractice. If the different sources offer different suggestions, we have to evaluate their reliability from multiple angles. We can ask ourselves: Is the doctor professionally qualified or experienced? Can we trust the experience of this recovered patient? Is his/her experience an isolated case? Are the medical books and literature written by an authoritative and established organisation or professional? Of course, we may not be certain about the reliability of all information. But if we can be sure of some of that information, we will be able to learn its value, and utilise it to make better decisions.

Does this mean that we have to spend so much time analysing every single decision we make? No. However, students should understand that when facing important decisions, we should only take reference from but not blindly trust the professional. We have the ability to weigh the benefits and drawbacks of other people’s suggestions, and learn to source information and comments to consider the same issue from different perspectives.
Extended information

As Dr Vernon Coleman wrote in his book *How to Stop Your Doctor Killing You*\(^3\), doctors are not 100% correct. Putting too much trust in your doctor will only lead to an over-dependent mentality, making the patient forget that s/he is the rightful consumer who has the need to know and be doubtful. Moreover, despite advances in modern medical technology, medical malpractice is still common. This means that we cannot blindly rely on technology. We have to remain sceptical, collecting different information and listening to different suggestions. Then we can make decisions through critical thinking. In the USA, there were more than 100,000 cases of deaths due to misdiagnosis in 2006 alone. The number is equivalent to that of a 400 people Boeing 747 flight crashing every 3 days, and far exceeds AIDS-caused deaths. It sits alongside leading causes like homicide and car accidents as the number 8 cause of death in the USA. According to the United States National Institute of Health (NIH), among 100 patients who have been proved by autopsy to have heart disease, only 53 were correctly diagnosed when they were alive. Among them only half received correct treatments.

Despite the improvements in medical technology, the frequency of medical malpractice has always been high. The majority of these incidents are caused by human error.

In July 2008, a public hospital paediatrician with 10 years of experience wrongly prescribed 2.5 milligram methane for intravenous injection to a baby. It was intended for sedation purposes but was 10 times the normal dosage. The mistake was not discovered until 15 minutes later. Luckily the condition of the baby stabilized after emergency treatment\(^4\). In October 2007, a nurse in a public hospital forgot to label the bottles for clear water and disinfectant used in operations. Operators then mistook clear water for disinfectants, using it to “disinfect” surgical instruments for a brain surgery. They then used the same bowl of water for “disinfection” in 4 prostate surgeries. Luckily no one was infected\(^5\). In the same month, after a blood test at another local hospital, the chemist accidentally swapped the blood sample of a 24-year-old pregnant woman who has serious anaemia with that of a 73-year-old man with heart disease. The woman with anaemia was not prepared for blood transfusion, her treatment was delayed for 7 hours before she received blood. The old man, on the other hand, was transfused two packs of blood for no reason\(^6\). These medical incidents are very common in both Hong Kong and other places, proving that despite their professional qualifications, we cannot put too much reliance on the label of “professionalism”.

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\(^3\) How to Stop Your Doctor Killing You

\(^4\) The condition of the baby stabilized after emergency treatment

\(^5\) Luckily no one was infected

\(^6\) The woman with anaemia was not prepared for blood transfusion, her treatment was delayed for 7 hours before she received blood. The old man, on the other hand, was transfused two packs of blood for no reason
In the scenario, we have learnt about the skills and attitude for decision-making. We should first locate the crux of the controversy, and make decisions with available information. When possible, we should collect more reference information and weigh their degree of reliability, rather than rely on the information or opinions from a single authority.

When considering issues of Liberal Studies, these techniques are also applicable. For example we can consider which factors influence our concept of public health and diseases, and what we need to pay attention to when facing such influences. In fact, when we try to make medical decisions for ourselves and our family and friends, many factors affect our understanding of diseases and public health, namely the differences in culture, availability of health information, social expectations, personal belief, and values.

For example, cultural background is an important factor influencing our understanding of diseases, just as island inhabitants trust animal instincts over scientific predictions. People of certain cultural background trust their traditional wisdom over science. In Chinese societies, many put their faith in Chinese medicine which has a weaker scientific basis. Some would even attempt to explain all phenomena with theories of weak scientific basis. One example is the “heat evil” (熱氣) which Chinese use to account for toothaches and irritability, but which is not comprehensible by medical doctors of the west. However, application of scientifically unexplained Chinese medical theory can sometimes help patients; it is sometimes helpful to apply traditional theory to explain some phenomena.

Also, personal belief and values affect our medical decisions. As in Scenario 1, the neighbouring nation trusts scientific instruments, the island inhabitants their experience and traditional wisdom. People of different backgrounds weigh various types of information differently. Another personal factor that affects decisions is the level of education. Those who are less well educated have a harder time understanding complex scientific concepts and texts, and therefore have a more difficult time accessing, understanding and utilising public health information in decision-making. For this reason, besides relying on the doctor’s suggestions, there is relatively little that they can do. They also lack the confidence to question opinions, and to conduct independent analysis of the limited data that they have. Of course, people who are better educated are more used to independent thinking, and would seek scientific evidence to confirm the information obtained before making decisions.
Because our understanding of diseases and public health varies with our cultural background, education level, personal belief and values, the government has to ensure information transparency and accessibility for people from different backgrounds (e.g. education level) to enable them to make good decisions. Citizens who are better educated can search the official names of drugs using the List of Registered Pharmaceutical Products\(^7\) provided by the Pharmaceutical Service of the Department of Health, and learn about the drug information at a professional medical database (e.g. PubMed\(^8\)). For the general public, the Drug Education Resources Centre\(^9\) (DERC) established by the Society of Hospital Pharmacists of Hong Kong is a good place to source references. The DERC website provides a drug information system for the general public, where they can search basic drug information including nomenclature, manufacturer, properties, usage, dosage, taboos, common side-effects, and drug interactions. If one is unclear or doubtful about the use of a drug, one can look up the database. In fact, to encourage patients learn more about the drugs they take, the Pharmacy of Queen Mary Hospital has pioneered the use of two “Drug Info Kiosk”. Patients only need to scan the barcodes on their drug packages into the reader to learn about the drugs they are taking. Allowing patients more information about drugs also minimises pharmaceutical errors\(^10\).

In fact, the government has measures in place to ensure that citizens take drugs safely. In 2003, the Hospital Authority compiled the *HA Drug Formulary*\(^11\) to standardise drug use in all public hospitals and clinics, and to establish a list of basic drugs. Drugs that are proven clinically and medically effective with minimal side effects are shortlisted for the use of the public. Regarding Chinese medicine, in 1999 the *Chinese Medicine Ordinance* was passed and the Chinese Medical Council of Hong Kong was established to regulate Chinese medicine. The Licensing of Chinese Medicine Traders and the Registration of Proprietary Chinese Medicines were also implemented mandating the registration of all Chinese proprietary medicines before import, local manufacture or sales. These Chinese medicine regulatory measures ensure the safety, quality and efficacy of Chinese medicine\(^12\).
Class Reflection

1. Try to give examples where problems were solved using traditional experiences, and discuss the contributions and limitations of traditional experiences in solving the problems.

2. In Chinese culture, what are the traditional experiences that are inexplicable by science? Can these traditional experiences survive the challenges of science? How can we verify such experiences?

3. Weather forecasts are sometimes inaccurate. Does it imply that scientific predictions are inaccurate? On what basis can we judge the scientific basis of a piece of evidence?

Classroom Activities

Please refer to the activities as suggested in Scenario Discussion and Activities.

References

Scenario 2

“Qualifications” for Childbirth?
Scenario 2
“Qualifications” for Childbirth?

Learning Objectives

The scenario describes the policy suggestions proposed by a political party. The party will attempt to use different arguments to argue for the evaluation of couples who have plans for childbirth, to ensure that they will be “qualified” parents.

Scenario Discussion

Guiding class to consider the hidden assumptions of the reasons of the political party and to learn how to assess the rationality of the conclusion.

1. Analyse arguments, and identify appropriate and inappropriate assumptions.
2. Distinguish between correlation and causal relationship.
3. Analyse whether the data indicates correlation or causal relationship.
4. Suggest other possibilities for the phenomenon of correlation.
5. Learn about how association effect affects our judgment and how it could be avoided.

Expansive thinking

Guiding class to consider the formation of prejudice, and how they can help themselves and people around them minimise discriminative behaviour.

1. Why are people prejudiced or discriminatory against certain communities?
2. How can we help the general public minimises prejudice and discrimination against minority communities?
3. How can we raise our awareness toward prejudice?

Technique Transfer and Application

Guiding class to applying the techniques acquired from the above scenario, to discuss the following Liberal Studies issues:

Module 2: Hong Kong Today

- How do different social groups, such as new arrivals, indigenous inhabitants in the New Territories and ethnic minorities, develop a sense of identity?
Scenario Discussion and Activities

Read the following scenario in detail and consider the related questions.

A political party proposed a legislation to make it mandatory for couples to be assessed and evaluated (pass an examination) before conception.

The party spokesperson proposed the following argument: most social problems are rooted in the growth processes of children. For instance, children subject to frequent physical punishment by parents are prone to be criminals in adulthood. Also, distanced relations between parents and children impact negatively on the latter’s social skills in adulthood whereas children from impoverished families often do less well academically and possess inferior self-image and confidence than same-aged peers. The spokesperson gave examples that require a certain level of competency or qualification: driving requires licenses, migration to foreign countries requires approval, and teaching requires the obtaining of certain qualifications. The rearing of young is a greater responsibility that directly affects the future development of society. The government should evaluate couples planning conception to decide which are more suited for raising children.
Suggested Activities

A. Discussion

Class or group discussion

1. Do you agree that couples planning conception and childbirth must first pass an evaluation?
2. Try to re-cap and explain the political party’s reasons and conclusion. Do you think they are correct? Why?
3. After discussing with your group mates, do you maintain the same views regarding childbirth qualifications? Why?

B. Television speech:

Assuming that you are the spokesperson of the party, you will be giving a television speech to the public to elaborate your party’s views on childbirth qualifications. Each group will be given 10 minutes to prepare, after which a representative will be nominated to give a 3-minute speech to the class. Class is reminded to note the following in the speech:

1. Please elaborate clearly your stance or views regarding the obtaining of qualifications before childbirth.
2. Use examples and reasons to support your points-of-view.
3. Please take into consideration possible questions the audience would raise, and narrate from both affirmative and opposing sides to make your points-of-view more convincing.
4. Please conclude, summarise and outline your points-of-view and main reasons in the concluding part of your speech.
5. Use eye-contact and gestures to enhance the effect of the speech.

The rest of the class, acting as the audience, may propose questions to the speaker after the speech.

C. Debate:

Two groups of students are selected to be the affirmative side and opposition side of the topic “Couples planning childbirth is allowed to do so only after assessment and evaluation”. Groups are given a few days of preparation, after which a debate will be conducted in class. The rest of the class will determine the strength and weakness of the reasons and evidence of both sides.
D. Raise similar examples:

Ask students to suggest similar examples and outline their reason of support or opposition. The teacher may give examples to illustrate the activity, but withhold the reasons to avoid copying.

Examples:

★ “Students buying soft drinks at school has to obtain medical or parental proof that they are not obese or diabetic; I support it because …”

★ “Those participating in charity marathon walks have to be proven physically fit by doctors; I oppose because …”
Explanation of Scenario  
Techniques to analyse arguments

This scenario presents no absolute answers. Class may either support or oppose to the proposal of “childbirth qualifications”. The following must be noted though:

1. Has the “evidence” (reason) proposed by the party been critically analysed?
2. Have the logical weaknesses and fallacies in the party’s arguments been pointed out?
3. Are strong reasons given to support one’s points-of-view (stance or opinions), and to criticise the points-of-view of the opposing side?
4. Have you tried avoiding the influence of prejudice?

On the surface, the party’s reason may appear valid, but class should note whether the reason is strong. For example, the party pointed out: “children subject to frequent physical punishment by parents are prone to be criminals in adulthood”. The points “subject to frequent physical punishment by parents” and “prone to be criminals in adulthood” are only linked by correlation, and not necessarily causation. We cannot determine what kind of relations exists between the two: which is the cause and which the effect? Or have other factors been affecting both at the same time? Another possible explanation of the phenomenon could be: violent adults could have been more rebellious as youth, and easily provoke the parents in giving physical punishment.

We cannot ascertain whether the parents’ background, aptitude and character have direct impact on the (negative) actions of the child upon adulthood, nor can we be sure that the parents’ background, aptitude and character are the only factors affecting the actions. Equally, we cannot construe the other reasons of the political party as causal relations, for that would likely lead to wrong conclusions.

If we examine the political party’s reasons, we would discover that they have committed the logical fallacy of guilt by association. Guilt by association means to associate the undesirable acts of one individual to other related individuals or groups. For example, because a certain couple’s erroneous actions have caused attitude and behavioural problems in their child, all parents are guilty of raising children who have attitude and behavioural problems. This is an example of association effect, and is unsupported by sufficient evidence.

Lastly, the political party believes because teachers and drivers have to be qualified, childbirth also needs to be evaluated for qualification. This is a weak analogy, because there is a great difference in their nature. There are no criteria in existence to assess whether a couple can be good parents, and objective conditions alone are not sufficient to determine which parents are qualified. Childbirth cannot be compared to driving. To use driving as an analogy for childbirth is logically fallacious.
Is the childbirth policy reasonable?

The scenario “Qualifications” for childbirth may sound whimsical, but similar examples could indeed be found in real life – one such example is the “fertility and population policy” in Singapore.

In the 1980s, studies conducted by the Singapore Government discovered that many highly educated women had chosen to not get married or have offspring. Meanwhile, poorly educated women were giving birth in abundance. To promote eugenics with the aim of enhancing the quality of its nationals, the Singapore Government implemented a series of population policies in 1984. On one hand, the government encouraged highly educated women to give birth to more children by offering higher childbirth subsidies, and having schools give admission priority to their offspring. On the other hand, to reduce the birth rate among low-income, poorly educated families, the government provided material incentives to women from such families who were willing to accept sterilization operations, while raising hospital costs for child delivery to discourage these women from having children.

What were the assumptions behind these policies? An obvious assumption was that children born of highly educated women were of higher quality; those of poorly educated women were of lower quality. Class should consider why the Singapore Government had made such assumptions? Were they valid? What were the evidence and reasons behind these assumptions? Did these assumptions point to the correlation or causation between the parent’s education qualifications and the quality of their children? Did the education qualifications of the parents directly affect the quality of their children? Can you offer examples to refute this assumption? Other than the academic qualifications, what factors can affect a person’s quality? What impact did this policy have on the society?

3 years after the implementation of the above policy, Singapore changed its population policy in 1987. The main reason was that the motivation for highly educated women was limited; most highly educated women were unwilling to change their plans for childbirth in exchange for material incentives. Also, these policies were vigorously objected by low-income families. The public believed that giving birth was a personal choice and that the government should not intervene. Overall, the policy did not achieve what it set out to do, and under public pressure, the government revised its population policy.
Prediction of the “quality” of the offspring based on class, ethnicity, education level, and income of the parents is not only unfair but is potentially discriminatory. However, certain attributes of a child, e.g. hereditary diseases, can be predicted based on the parent’s family medical history and health conditions. Such prediction has strong scientific backing and is stringently verified. If couples, for certain reasons, are worried that they will pass on hereditary diseases to their child, they can seek professional advice. If a family member from either side of the couple has had genetic diseases, with the help of genetics we can calculate the probability of offspring having hereditary diseases, and help family planning. Such professional service, named genetic counselling, is very popular in western countries⁴, it is also available in Hong Kong⁴.

Thalassemia is a severe hereditary disease, and causes acute, lifelong pain. In severe cases, patients require regular blood transfusion throughout their lives and have to suffer all sorts of complications from the transfusions and treatments. However, through body checks, couples can avoid giving birth to offspring that carry the disease. If both husband and wife do not carry the thalassemia gene, their offspring will not have the gene. However, recessive thalassemia gene carriers, do not exhibit symptoms while having inherited the gene. They usually would remain oblivious of the problematic gene unless through blood analysis. If parents passed on their thalassemia genes to their offspring, the child would have the chance of becoming a thalassemia patient. The probability of the disease manifesting depends on the parent’s gene makeup. If both parents are non-symptomatic carriers, the child has one-in-four opportunity of exhibiting severe thalassemia, and two-in-four opportunity of exhibiting light thalassemia. Because the thalassemia gene can remain hidden, pre-marital check-ups are important⁵.

Also, through pregnancy check-ups, certain genetic disorders (for example, Down’s Syndrome) can be revealed. According to the Offences Against the Person Ordinance⁶, if two registered medical practitioners are of the opinion, formed in good faith that “there is a substantial risk that if the child were born, it would suffer from such physical or mental abnormality as to be seriously handicapped”, the mother can choose to terminate the pregnancy through a registered doctor. Although it is legally allowed, abortion is a morally highly controversial act. Some believes that no matter what diseases the infant has, anyone – including the parents – has no rights to deprive the infant of the right to live, just as we cannot take away another’s life with our own standards. Some, however, believes that an embryo in its early developments is not life, and we should not neglect the lifelong pain that the parents may suffer from their child’s hereditary disease.
From the above scenario we come to understand because of the confusion between correlation and causation, or the effect of guilt by association, people easily form unfair views on certain social groups. This phenomenon manifests not only as prejudice for class or income, or on birth policies. The above techniques can be applied to analysing the issue of prejudice and discrimination against other groups, and how such discrimination affects their identity formation.

While often used interchangeably, prejudice and discrimination are in fact different in meaning. Prejudice is a stereotype we impose on an individual based on the group s/he belongs, for example her/his ethnicity, sex, age, sexual orientation, interest and occupation. For instance, an individual's occupation is weakly related to whether s/he is a loner. If you consider all scientists to be “eccentric, boring and withdrawn”, you would be imposing an inaccurate stereotype on scientists. If you act negatively upon your prejudice for certain individuals, you are guilty of discrimination. If, based upon your prejudiced perception of scientists as “eccentric, boring and withdrawn”, you refuse to befriend scientists, you are discriminating against them. Psychological prejudice can be realised as behavioural discrimination; they are the two faces of the same coin of the manifestation of negative stereotyping.

In a world city like Hong Kong, we live with a great number of people who are from different cultural and ethnic backgrounds, e.g. new migrants and ethnic minorities. Their perception of the Hong Kong identity is affected by our prejudice. Imagine that if you are on foreign soil, and you are suffering difficulties in life from discriminations, how could you identify with the local culture and the local identity? New migrants and ethnic minorities in Hong Kong, for example, have a difficult time finding stable jobs with reasonable pay, and naturally see themselves as outsiders. No matter how long they live in Hong Kong, they do not consider themselves a Hong Kong citizen. Eliminating discrimination against new migrants and ethnic minorities is a crucial condition to fostering in them a sense of belonging in Hong Kong.

Try to call if you have, under the influence of the media or people around you, prejudiced against certain minority groups that you lack knowledge of? When you are prejudiced towards certain people, you easily perform discriminatory acts based on inaccurate concepts, e.g. treating individuals unfairly because of the groups to which s/he belongs. If so, you may do well to remember the techniques learnt from this scenario to help us
minimise influence from guilt by association. Even if we notice the negative attributes certain minorities may possess, we should know that such attributes are only linked by correlation to their group identity, but not caused by the identity. It might well be that the negative attributes are a result of frequent discrimination by the majority.

Realisation of individual acts of discrimination certainly requires the support of government policies. The government should act decisively to eliminate discrimination against minority groups, and help foster an anti-discriminatory culture in society. On 10 July 2008, the Legislative Council of the Hong Kong Special Administrative Region passed a bill to ban racial discriminatory acts. Racial discrimination does happen in Hong Kong, for example ethnic minorities have been rejected from renting a property or attending job interviews. The newly passed Race Discrimination Ordinance applies not only to private organisations but also to government and education organisations, and hospitals under the Hospital Authority. The Ordinance has provisions for direct and indirect racial discrimination, and prohibits certain actions of racial discrimination. With the implementation of the Ordinance, better legal protection is now offered to ethnic minorities which helps reinforce their sense of belonging to Hong Kong.

Class reflection

1. What events in life are linked only by correlation, but often misinterpreted for causation? Why do we think that these events are linked by causation?
2. Can you give more day-to-day examples of guilt by association? Why are we easily prone to this fallacy?
3. Give examples of discriminatory phenomena, account for their causes, and suggest ways to minimise the discrimination.

Classroom Activities

Please refer to the activities as suggested in Scenario Discussion and Activities.

References

2. Ibid.
Scenario 3
A Billionaire’s Hobby
Scenario 3
A Billionaire’s Hobby

Learning Objectives

The scenario describes a billionaire who has a peculiar hobby: he loves to use bank notes as wallpaper, and paste them on the walls at home. Such behaviour drew tremendous criticism.

Scenario Discussion

Guiding class to consider the nature of values.

1. Consider the differences between values and absolute rules.
2. Understand how a value-embedded mental model influence one’s thinking.
3. Learn that values can change.
4. Identify different factors that influence values.

Expansive thinking

Guiding class to learn about the true nature of values, to break away from concepts we have about family values and gender roles.

1. How do traditional social values define families and the roles of men and women in families?
2. Why do these values exist? Are they still applicable in modern society?
3. What social roles do we expect from men and women? To what extent are these expectations reasonable?

Technique Transfer and Application

Guiding class to applying the techniques acquired from the above scenario, to discuss the following Liberal Studies issues:

Module 3: Modern China
With respect to the evolution of concepts of the family, what kind of relationship between traditional culture and modern life has been manifested?

• How have the traditional concepts of the family been challenged in modern life?
• To what extent have the traditional concepts of the family been maintained in modern Chinese life? Why?

Module 2: Hong Kong Today
What directions might be chosen in maintaining and improving Hong Kong residents’ quality of life?

• What are the different opinions of Hong Kong residents on the priorities which constitute the quality of life?
Read the following scenario in detail and consider the related questions.

You read a news article on a billionaire’s peculiar hobby: he likes to use bank notes as wallpaper at home.

The billionaire had too much money to spend. He already had everything he wanted. He did not want to donate his money to charities. Since who knows when, he developed a hobby to paste the bank notes on his walls. This peculiar hobby received much criticism. Many thought that those who were capable to help others should bear greater social responsibility and contribute to society. They should spend meaningfully, in ways such as helping the poor. In response, the billionaire said that he was wasting his own money and it was not other’s business. Lots of rich people wasted their money for pleasure, so why were they not getting the blame? Also, why did he have to give his hard-earned money to others for nothing?
Suggested Activities

A. Discussion (I)

Class or group discussion

1. How does the public criticise the billionaire’s hobby? What queries and refutations has the billionaire put forward?
2. If you were the billionaire, how would you react to public criticism?
3. Can you describe the different values held by the billionaire and the critics? Do you share the same values?

B. Role Play: The immediate family versus the outsiders

Organise the whole class together or in groups. Ask the students to play the billionaire and think up reasonable excuses to reject those who seek help. If a total stranger who is sick asked the billionaire for money, what would the billionaire say in rejection? Would his reasons be any different if that person were his (i) cousin, (ii) sibling, (iii) parents, (iv) adult son or daughter, (v) children or (vi) wife? Under what circumstances would he be compelled to help others? Why would he use different reasons to reject different people?

In comparison to strangers, do we have greater responsibility toward the following? If we do, what are these? (Ask class to list at most 5 kinds of people to whom they bear greater responsibility.)

   (i) Parents          (v) Cousins
   (ii) Spouse         (vi) Classmates
   (iii) Children      (vii) Teachers
   (iv) Grown offspring

C. Discussion (II)

Class or group discussion

1. Do you have any existing belief or prejudice? If you do, what are these?
2. How should we deal with conflicts resulting from contradicting values when our values are different from others?
3. What are some of the most important qualities of life to you? List five. Are any of these related to personal behaviour? To which does the government bear more responsibility?

Discussion & Report

After 30 minutes of discussion and preparation, two representatives from two groups of students are invited to submit a 5-minute report to other students to present and explain discussion results. The student audience can ask questions after the report.
Invite the students to say what they think about the billionaire’s habit. The following guidelines can help them think critically.

When we consider an argument, we usually look at how convincing the reason is. We should also find out the assumptions behind the argument and judge whether the assumptions are rational. For example, those who criticise the billionaire believe that people who are capable of helping others bear greater social responsibility. We can see at least two assumptions in this argument. Firstly, people who are capable of helping others have greater responsibility than average individuals. Secondly, helping others is an obligation, not just a responsibility. This obligation grows with our ability. Does class agree to these two assumptions? If they do, ask them to think on a deeper level: Do these assumptions represent subjective values sculpted by culture and therefore susceptible to change? Or are they absolute rules?

Societies with different cultures live by different values. Our values might go against those of a different society. For instance, the Mosuo, a small ethnic group living around the Lugu Lake in Yunnan Province in China, practises a special custom called “walking marriages”. This practice defies the monogamous marriage model. In a “walking marriage”, a Mosuo man does not have to marry the woman he loves before having a child with her. The child will take on the mother’s family name. The child lives with the mother and will be raised in the maternal side of the family. Family values behind this practice contradict those of the modern society. Firstly, the Mosuo ‘husbands’ and ‘wives’ share no obligation to take care of one another. The husband does not live with his wife and child, and has no hand in raising the child\(^1\). Unlike us, the Mosuo does not share the same family values under a monogamous marriage model. Secondly, the Mosuo child takes on the name from the maternal side and the father has no right to raise his child. In a family, a man’s status is much lower than a woman’s. In other words, the patriarchal social values held by most parts of the world do not apply to Mosuo society. To the Mosuo, the practice of “walking marriage” is a custom passed down through the generations. This shows that different cultural environments breed different values. We cannot judge others with our own values. We all have different values and there is no absolute right or wrong. When we judge whether a system of values is rational, we cannot see it as a rule or truth. We should consider the cultural background of the system.
Values are in fact representations of a mental model, by which our attitude and behaviour are moulded. A mental model generally refers to the underlying implicit beliefs, thinking tendencies or biases in our daily lives. A common mental model, for example, is the belief that ‘Chinese medicine or supplements of higher prices are better for the body’. But when we pay for an expensive Chinese medicine, are we really clear about its quality and functions? Is it just a blind belief that a higher price guarantees better quality? We may not realise that very often our behaviour is affected by our mental model. Here are two more examples: If you think that a doctor’s prescription for a flu is similar to over-the-counter drugs, you may choose to the latter instead of the former; if you believe that sweating is a good cure for flu, you may take a hot shower and neglect the negative effect that the heat might do to your fever or other sickness that you may have.

Have the students realised any of their own mental models that are yet to be verified? Some of the mental models are certainly correct, but not all of them. Regardless of the authenticity of these models, if you accept them without critical judgment, your attitude, way of thinking and behaviour will be influenced.
Expansive Thinking

How are values created?

Although the story about the billionaire is merely fiction, in reality it is not rare to see conflicts caused by a clash of values. Traditionally, the Chinese believe that men should be the breadwinners while women the homemakers. The father serves an instrumental role of earning a living and keeping the family in contact with the outside world. He provides all resources needed to maintain the family. For the mother, she plays an affective role of caring for the family and doing house chores. These traditional family values shape our understanding of ‘families’. Invite the student to think about the following: What are the assumptions behind such family values? Why do these values or assumptions exist in the traditional society?

In Hong Kong, by now, where the chances for education, career and marriage are equal for both men and women, traditional family values face great challenges. Many families have conflicts over men and women’s gender roles. In a significant number of countries, there is a growing number of ‘Stay-at-Home Dads’. Men play the role of the traditional female and do house chores while women earn a living for the family. In the face of cultural change, if men stick to the traditional values and refuse to take up the ‘female role’, conflicts cannot be avoided.

Ask class whether they also have similar family values and why. Do men and women have different endowments that made them suited to different social roles? Or is it just subjective thinking that men are better equipped for social activities while women are meant to stay home? Is this subjective view rational? To further develop the discussion, invite class to think about the following questions. Traditional family values were popular in the old farming society for a reason. But in the modern society, should we accept it without a doubt? Before we adopt a particular set of values, we should consider the rationale behind and judge whether it is suitable for the modern society. Accepting traditional values without asking why is neither good for personal development nor the progress of the society.

Apart from families, gender roles are adopted by society in a larger context. Gender roles refer to society’s general expectations towards the behaviour of men and women. To give some examples: we expect women to wear dresses but not men; men love football while women love shopping; men are more rational and suitable for science subjects while women are more emotional and suitable for arts subjects, etc. In the different professions of society, gender roles can also be observed. We often think that professionals and senior
managerial roles are taken up by men while secretarial positions are mostly taken up by women. Behind concepts like these are assumptions that men and women are different both biologically and psychologically. Some of the assumptions are rational, such as men are physically stronger. But some of the assumptions are erroneous, such as men are better in mathematics and science. We are often told that men are better in spatial and mathematical intelligences and women are stronger in language. In fact, a significant number of psychological studies have proved that the differences are minute, and it largely depends on what types of questions we use to test those so-called ‘mathematical’, ‘spatial’ and ‘language’ abilities\(^2,^3,^4\). With the differences between the two genders barely noticeable, we should examine whether the gender roles are rational.
In Hong Kong, men are often the family breadwinners and women the homemakers. According to the statistics of the Census and Statistics Department of the Hong Kong Government in 2007\(^5\), the average labour force participation rates by sex are 70.5% for male and 53.1% for female. It is obvious from the statistics that compared to men, less women look for work. Judging from this statistics alone we may explain that perhaps more women are unemployed (the unemployed, as defined by the government, refer to those aged 15 and over “who have not had a job and have not performed any work for pay or profit during the 7 days before enumeration”). If we look at the rates by martial status and sex, we see that the average labour force participation rate of women who were ‘never married’ was 68.8%, which was close to their male counterparts, which took up 67.3%. But if we look at the rates for the women who were ‘married’, only 46.3% joined the workforce, which was much lower than the rate of their male counterparts, at 72.1%. From here we can see that less married women join the workforce.

On the other hand, the career distribution between the genders is not balanced according to the Census and Statistics Department\(^6\). As shown in the 2007 figures, 90% of ‘plant and machine operators and assemblers’ were men. It might be because men are physically suited for this type of work. Still, for the less physically challenging work, men maintained dominance. Among ‘managers and administrators’ and ‘professionals’, men occupied 70.2% and 63.4% respectively. For women, they outdid men in the category of ‘clerks’ and ‘community, social and personal services’, with 73.0% in the former and 67.3% in the latter. These distributions could not be explained by the differences of abilities between the two genders.

And of course we should not simply see this as sex discrimination. This phenomenon does reflect the existence of gender roles in Hong Kong society. As a whole, women’s education level is lower than man. This is because women of the older generation did not have a fair chance to receive education when they were young. In 2007, among women aged 15 or above, 72.9% attained the level of secondary education or above. The rate for men was higher, reaching 80.1%. Provided that both sexes have similar mental aptitude, differences in learning ability should not be the reason for the discrepancy in education level. The following are some probable reasons for the students to think about: Are limited family resources a reason for the parents to offer education to their sons, who would be the breadwinners in future? Besides, is it possible that women internalised their gender roles and agreed that ‘girls do not need that much education’?
Despite the fact that family values have been guiding the distribution of labour, gender roles have been weakened over the generations, as well as the traditional values. Research done by the Census and Statistics Department\(^7\) shows that the difference in labour force participation rates between the two sexes has been significantly reduced since the start of the 1990s, which shows that the mainstream family model has faded through time. According to the *Evaluation Report on Gender Equality and Women Development in China, 1995-2005*, despite China’s firm stance of rejecting the traditional family model, there is still a 17% difference between the labour force participation rates of the two sexes. As revealed in a cross-country research, more people are opposing traditional gender roles. In 2002, the percentages of women who strongly refuse to accept gender roles have increased in Japan, South Korea, the Philippines, the U.S.A., Sweden, German and the U.K., by 14%, 2%, 11%, 7%, 15%, 19% and 14% respectively. Among these countries, the number of women in Sweden who firmly rejected gender roles has reached 88%, followed by the U.S.A., the U.K. and Germany, where over 50% of women also shared the same view\(^8\).
From the discussion above we learn a few characteristics of values. They are not absolute rules or truth. Values are affected by different cultures and generations and they can change. There is no simple right or wrong about values; we can only judge whether it is rational under a specific culture. Thus, we should not blindly follow others. Only when we agree with the rationales behind, we will accept respective values.

Since values can be sculpted, many traditional concepts of the family in China have unavoidably run into conflict with new ideas during modernisation and undergone various changes. Many characteristics of traditional Chinese families, such as the emphasis on the father-son relationships and family ownership of property, have faded under the influence of the western family culture and modernisation. Societies nowadays have placed a much stronger emphasis on individual rights. Children are no longer expected to succumb to the fathers’ authority. The Chinese society has also proceeded gradually from authoritarianism to egalitarianism. Apart from that, people have realised the importance of property rights. The idea of family ownership of property has therefore changed. The Chinese have developed their own concept of property. They no longer share a single bank account and make deposits together. The Chinese society has gradually changed from collectivism to individualism. It is obvious that values are susceptible to the influence of foreign culture, changing concepts and even government policies.

Changes in values brought about transformations in family models. For instance, when the Chinese began to recognise individualism, they became less concerned with the welfare of the family as a whole. Family bond is weakened when compared to that of the traditional society. Besides, due to changes in social culture, families are no longer the tools for inheritance of status. It is instead a safe place where one looks for emotional support. The emphasis on authority status in traditional families has changed to division of labour, communication and mutual support. China is currently undergoing changes in economic structure and switching to knowledge-based economy, there are more opportunities for women. Chinese women in modern cities, especially those who are highly educated, can enjoy good quality of life without having to marry. Their urge to get married is weakened. Some women stay single, or get married at a later age and some prefer to cohabit with their partners. The traditional family model is undergoing a fundamental change.
Besides changes in time and culture, certain social events will also have a short-term effect on values. For instance, after Severe Acute Respiratory Syndrome (SARS) in 2003, Hong Kong people have changed their views about the value of life. After SARS, a local political party, using questionnaires, interviewed 872 parents aged 18 or above and found that 28.9% of the respondents considered health as the most important thing in life and family ranked second in 26.3% of the respondents. Money and career, which was rated first in a similar research done in January of the same year, only came third and fourth. Before SARS, people believe that ‘money is king’ and ranked career, family and health after it. The research conducted after SARS also pointed out that the most desired gift for Mother’s Day among the mothers was “health to all family members”. Hong Kong people very much changed their set of values because of the pandemic disease. They prioritised the quality of life differently. From this example, we can see that values and society are closely related. When our lives and culture are shaken, we might change our values.

Classroom Activities
Please refer to the activities as suggested in Scenario Discussion and Activities.

References
   Intelligence, 32, 25-32.
6. Ibid.
7. Ibid.
Scenario 4

English Study Tour
Learning Objectives

The scenario describes a situation of choice: you hope to bolster your English language skills during the summer vacation, and have decided to apply for an English Study Tour in the U.S.A. Now, you have the basic information of two study tours for your choice.

Scenario discussion

Guiding class to make rational and informed decisions, and teaching students skills in making consumption decisions.

1. When making decisions, identify the core issue.
2. Distinguish between data, facts, opinions and arguments; use them appropriately when making decisions.
3. Consider different factors when making decisions.
4. Weigh the priority of all factors affecting the decisions.
5. Make well thought-out decisions after considering all factors.

Expansive thinking

Guiding class to reflect upon how decision-making skills can be utilized for them to become smart consumers.

1. What factors affect our daily consumption behaviour? How do business people make use of these factors to boost sales?
2. How can we avoid irrational consumption behaviour?

Technique Transfer and Application

Guiding class to applying the techniques acquired from the above scenario, to discuss the following Liberal Studies issues:

Module 1: Personal Development and Interpersonal Relationships

• What are the current salient trends that pose particular challenges and opportunities to adolescents in Hong Kong and how do they respond to these trends?
Scenario Discussion and Activities

Read the following scenario in detail and consider the related questions.

You hope to bolster your English language skills during the summer vacation, and are planning to enrol in an English Study Tour in the U.S.A. You are considering the four-week Study Tour offered by two private education organisations.

Organisation A (A) emphasises on home-stay residence and first-hand experience of local culture. Organisation B (B) attracts participants with a rich, tightly-packed sightseeing itinerary. A staff of B points out that tour participants would be sightseeing at various cultural and historical sites in extra-curricular hours. He reminds you that because their study tours are well-reputed, enrolment was keen and quotas were almost full. Because B charges 10% more than A did, you are hesitant. You asked your sister’s opinion. She tells you that a friend has joined the study tour organised by B, and her opinion is that while B charged more, it is worth the extra.
**Suggested Activities**

**A. Discussion (I)**

*Class or group discussion*

1. What do you think the crux of the problem is?
2. Can you decide which study tour to join based on the above information? Why?
3. The decision might be difficult. Now assuming that you have five questions that you can put to both organisations. What would you ask? Jot down these questions, and arrange them by importance (starting with the most important question).

**B. Experience sharing:**

**The consumer’s choice**

Divide class into groups and let them share their experience of visiting a recent trade fair (e.g. book fair, computer fair, comics fair), including the following aspects: (i) Is a target of purchase set before visiting the fair? (ii) Are unplanned purchases made? Are these products suitable or frequently used? (iii) Any experience of buying unsuitable products? What are the main considering factors? Did you realise having neglected anything?

**Irresistible trends**

Divide class into groups and let them share their experience of resisting trends, including: unable to afford new handsets even though the handsets of other classmates are newer than their own; unable to watch popular TV shows because of revisions; unable to play new online games because computer use is shared among family members. Facing these situations, how have you coped with the pressures of following trends? What are your experiences of success or failure?

**C. Discussion (II)**

*Class or group discussion*

1. Why do we tend to trust the words of salespersons?
2. Have you had the experience of being persuaded by salespersons using irrelevant or misleading information?

**Discussion & Report**

After 30 minutes of discussion and preparation, two representatives from two groups of students are invited to submit a 5-minute report to other students to present and explain discussion results. The student audience can ask questions after the report.
Explanation of Scenario
Techniques in consumption decisions

When making decisions, students often miss the core of the issue. In the scenario, the main aim of your joining a study tour is to improve your English, thus the core of the issue is choosing a study tour that best helps improve your English. A learning element is crucial to study tours; if only for fun and enjoyment, study tours are a poor substitute for conventional package tours.

Upon identifying the aim, students would find out that the above information is not sufficient to allow us to make good judgments. The text above only provides non-critical information, which is not helpful in making a decision as to which study tour better helps participants learn English.

Class should take care not to be misled by the information provided above. For example, class may think that a study tour must be good because it is popular. This is not necessarily true. A student may ask, “If the quality of a study tour is poor, how could it attract such high numbers of participants?” Yet what is worth noting is that the number of participants does not reflect the quality of the tour. “Quotas soon full” is very often nothing more than a promotion strategy. Do you actually know the real quota and enrolment numbers?

Take another example: in the scenario, your sister’s friend believes B to be worth the cost despite the higher fees, but do note that while she might consider B’s tours to be better, her aims are not necessarily the same as yours, i.e. the same opinion may not reflect equal truths. Class should beware that opinions do not necessarily equal facts.

Class should avoid being affected by peripheral information. For example, “rich and tightly-packed itinerary” and “sightseeing at various cultural and historical sites” are not of foremost importance to learning English. When weighing different factors, priority should be given to whether tour arrangements match your aims of participation (the core of the issue – improving English level). You might need to take heed of the following issues: what are the major English learning avenues for the tour? How many hours of English classes per day? Are the instructors qualified local English teachers? What is the daily schedule of the tour? Could there be too many students in the tour to affect effective learning hours?

When making any decision, class should pay attention to whether the information provided is sufficient and relevant, and should make considerations based on one’s own aims. In daily lives, whether in advertisements or other’s lobbying, peripheral or irrelevant information are abundant; class should stay vigilant.
Consumption is an indispensable part of our daily lives. In Hong Kong, “the shopping heaven”, spending is even more common. But how to be a rational consumer in the spending process is something that deserves careful consideration.

Each year, Hong Kong organises various trade fairs including the Book Fair, Comic Fair, and Computer Fair. These extravagant exhibitions are lucrative for both companies and consumers. The Computer Fair of 2008 has broken the annual record for daily visitor count (reaching 120,000) and total visitor count (reaching 450,000). The total sales turnover was more than 230 million Hong Kong dollars\(^1\). Achieving such impressive sales figures in the middle of the financial tsunami was a particularly extraordinary feat, making this a successful exhibition event.

As the exhibitors profited, we may do well to look at the situation from the angle of the consumer.

First we have to identify the core of the issue, i.e. the aims of consumption. The basic aim of any consumption is to satisfy the consumer’s need for certain items or services. Whether consumption will satisfy his/her need for the product should be the deciding factor as to whether the consumer will make the purchase. When we look at the trade fairs in their dazzling variety, we might ask ourselves why people are making such generous purchases in these trade fairs. Do they truly need these products, or are they making purchases because of the price reductions made by the exhibitors? We should be aware that pricing is an important factor to consider when making a purchase, but not the core factor. The implication is that if the product is a necessity, it is natural to pursue a low pricing; otherwise, if we are making the purchase only because of the low pricing, it would not be rational. Try to recall whether you have previous experience making purchases simply because of price reductions? Afterwards, are these products as useful as you have expected? If the aims of consumption are not clear, it easily results in waste. In the long term, one could foster a habit of impulsive purchasing, bringing unnecessary burdens to life.

Besides price reductions, class should be notice how these trade fairs boast all manners of peripheral information. Such peripheral information would subconsciously affect our consumption behaviour. For example, exhibitors would promote their products using such wordings as “final reductions” or “limited availability”, or that the media would highlight the number of fair goers to create an impression of intense popularity. Class may think about what kind of influence would such information have on the behaviour of consumers? Are they core factors to making purchases? How would others’ behaviour affect us? What are their reasons for making purchases, and are these factors sufficient to convince us? How should we avoid being misled by peripheral information, and make irrational decisions?
In trade fairs, an excess of peripheral information or non-core factors attracted and
distracted consumers’ attention, so that they neglected the core factors in consumption,
leading to irrational buying behaviour. We should try to list and analyse some of the factors
that affect spending behaviour:

(1) **Boosting sales through price reductions**
The most obvious sales boosting technique is the low pricing. The pricing is not directly
relevant to whether you need the product, and therefore it is not part of a core factor. If
we have no use for the product, no matter how low the pricing is, buying it would only
lead to waste. The core factor is consumers’ need for a product. With the price reduction
in the Computer Fair, consumers become less concerned about the core factors, and
would easily make a purchase purely because of the low pricing. They would neglect
its functions, performance, durability, even aesthetics and the fundamental factor –
whether it is needed.

(2) **Deadline effect**
The exhibitor imposes limited time or quantity to encourage purchase in the Computer
Fair. The consumers would think: all discounts are off after today, so we must grasp the
chance to make a purchase. Worrying that they would miss an opportunity, they do not
have sufficient time to think and make correct choices, resulting in irrational spending
behaviour. In the English Study Tour Scenario, B also used the technique of “limited
availability” in an attempt to capitalise on consumers’ fear of missing the opportunity.
This also leads to rash decisions on the part of the consumer.

(3) **The atmosphere of the venue**
In the Computer Fair, there is a large crowd confined in one place. Because everyone
around you is spending, the consumer, to act as one with the crowds, will “go with the
flow” and make purchases. The aim is to act in concord with the group, rather than out
of a real desire or need. Media depictions and promotions allow the area of effect to
spread to all of Hong Kong, urging those who originally have no intention to go to the
Computer Fair to go and spend.

We can understand from the above examples that actions of consumption involve factors
of sentiment; we cannot and does not make rational analyses before every purchase.
Particularly when time and information is scarce, we tend to buy intuitively and disregard
rational analysis. In these situations, we can use simple, fast and effective ways/intuitions
to make decisions, called **cognitive shortcuts** in psychology. For example, when time and information is scarce and you are unclear about your decision, would you choose a product that many have bought, or one that no one buys? Naturally we pick the former, because when time and information is scarce, we tend to believe in the correctness of the choice of the majority. This is an example of cognitive shortcuts. Such decisions are not totally unreliable, but if given enough time, and the decision we make has profound implications, we should not rely only on cognitive shortcuts but make decisions with a rational and cautious attitude.
Technique Transfer and Application
Suggestions for Liberal Studies

In the information age, youths face an abundance of commercial information. As per above discussions, if we do not constantly pay attention to how peripheral information affect our decisions, and understand the core factors affecting purchase decisions – for example need and product quality – we easily fall into the trap of impulsive buying.

Impulsive buying exists in Hong Kong. Such actions are reflected by credit card use statistics. According to figures from the Hong Kong Monetary Authority, in the first quarter of 2008 unpaid credit card balance reached 24.4 billion$^2$, indicating that lots of people have not considered their repayment capabilities when spending unearned money. Many among these are youths. A counselling organisation points out that certain graduates have owed credit card debts up to over ten thousand$^3$. Some graduates borrow money to go on graduate trips; some, upon beginning work, dine lavishly with their friends; girls buy new clothing for work. Such behaviour inadvertently turns into overspending. The existence of such channels as credit cards and loans lure youths into spending unearned money, increasing the chance of impulsive buying and financial imbalance. The majority of such expenditures are probably based on impulsion. Try imagining that if we can be immune to the influence of peripheral spending information, and buy only what we need, we can reduce waste and expenditure.

In fact, what youths need to pay attention to and be on guard against are more than just their own spending behaviour. In life, youths would be called upon to make various decisions including further studies, choosing extracurricular activities, on-line activities, and community activities. They should take care to not let the peripheral factors overshadow the core ones, which could lead to regrettable decisions. Furthering studies or picking subjects, for example, involves one or multiple key decisions. When choosing to study abroad, would you prefer certain locations over others because of majority choices? Would you pick your friends’ destination because you want company? Company and majority choices are certainly lucrative, but we should avoid neglecting core factors such as whether the education system, the culture, and the target institution are suitable, or that the subjects available fit your personal interests. If one is studying abroad for future developments and learning opportunities, company and popularity are unimportant factors. This applies also to local further studies, choice of institutions and subjects, or class/subject choices at different stages.

We have talked extensively about the peripheral information youths may encounter when making decisions, and how such information affects these decisions. Another type of
information that is influential for youths (often peripheral) is trends. Trends are collective activities that appear abruptly and sustain a period. Online gaming is such a trend. Since its emergence, online gaming has many youths or even adults addicted, becoming the topic of concern and part of the life of many. Another example is the trend of drug abuse. According to the Narcotics Division of the Security Bureau, the number of teenage drug addicts under the age of 21 saw a worrying rising trend in recent years. In 2007, the number of teenage drug addicts was 2,999, up 37% over the past 3 years. The proportion of first-time reported cases also saw a significant increase. The data indicates that drug abuse has indeed become a trend among youths. To youths, trends could be challenges as well as opportunities – it all depends on how trends are handled.

Teachers can guide the class to consider: what kinds of trends are prevalent among the youth groups in Hong Kong? How should we face them? Take an example, if you noticed certain friends taking drugs in a party, and were invited to join in, what would you do? Can students consider calmly the impact of drug-abuse, and make rational decisions? Learning to handle the challenges brought on by such trends are important lessons for youths. The consequences can be disastrous if they succumb under such trends.

Also, we cannot belittle the challenges brought on by such trends as online gaming. While they may appear trivial, if improperly handled the consequences can be equally dire. Recently, youth addiction to gaming, online or otherwise, has become a trend; the flood of gaming machines is worrying. Citing a 2009 study, Ming Pao Daily pointed out that over 80% students own gaming machines, with on average 2.7 machines per person. A specialist in psychiatry has pointed out that such machines are not to be handed out lightly, because excessive gaming is believed to be a cause for social and behavioural problems. Some youths suffer health issues because of over-indulgence in gaming. In March 2007, a 13 year-old boy played online games for 10-hour without break, and suffered seizures resulting from the physical strain. Youths must adequately tackle the influence of the online gaming trend, learn to manage time wisely, be independent, rational and disciplined. These are major challenges for budding youths. When facing various social trends and pressures, one should be independent and rational. On one hand one should understand whether the trend is for you, on another hand participate with a mature and disciplined attitude.

Youths face a diversity of growth opportunities and challenges; the handling of trends is an important area. When facing trends, youths need to make decisions based on a rational balance of the priority and importance of all choices; only then can they make good decisions. If one were to have poor decision-making techniques and blindly put their trust in people around them, one would, at the least, be a non-reflective trend-follower, and, at the worst, endanger one's future path and health.
**Classroom Activities**

Please refer to the activities as suggested in *Scenario Discussion and Activities*.

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**References**

Scenario 5
Movie Study
Learning Objectives

The scenario describes a university professor using questionnaires to study how films are related to criminal tendencies. Based on his research results, he recommended the government to tighten the grading of action movies in respective legislation.

Scenario Discussion

Guiding class to discriminate between correlation and cause and effect / causal relationship, and understand their nature and relationship, and the differences between the two.

1. Understand that a conclusion of cause and effect / causal relationship cannot be derived only from correlated data.
2. Learn to provide explanations other than cause and effect / causal relationship for conditions of correlation.
3. Reflect on the possible misleading messages contained in correlated data.
4. Understand the benefits and drawbacks of using questionnaires in study.

Expansive thinking

Guiding class to consider day-to-day situations where one could be misled by correlation.

1. Children of families who hire foreign domestic helpers have better English proficiency. How do we explain this phenomenon?
2. What attitude should we take when dealing with research reports cited by the media or in advertisements?

Technique Transfer and Application

Guiding class to applying the techniques acquired from the above scenario, to discuss the following Liberal Studies issues:

Independent Enquiry Study

• collect data, evidence and information through means appropriate to their enquiry

Module 1: Personal Development and Interpersonal Relationships

• (Explanatory Notes) Current trends related to Hong Kong adolescents understanding of certain trends such as consumer behaviour, substance abuse, extensive extra-curricular activities, online activities, community involvement, etc., and analysis of the causes and patterns of these trends
Read the following scenario in detail and consider the related questions.

A certain professor in a local university conducted a study on the effect of movies on teenagers below the age of 18.

The professor hired several dozens of researchers to conduct questionnaire survey outside 30 different cinemas, targeting youths of the age of 13 to 17. The study lasted 4 weeks, and was carried out during office hours of Monday to Friday. A total 7,600 youths were involved. The study found out that the favourite movies genre for over 60% of the interviewees were action movies. And in those who liked action movies – accounting for 80% of all interviewed youths – 16% has criminal records; on the contrary, only 2% out of the remaining 20% of youths who disliked action movies have criminal records.

Also, those who liked action movies are on average less well-educated.

As per the above data, the professor reached this conclusion: for youths, action movies are not only a disincentive for school studies, but also promote criminal tendencies. Based on the study, the professor suggested the government to tighten the grading of action movies; otherwise social ethics will deteriorate.
Suggested Activities

A. Discussion (I)
Class or group discussion
I. Comment in detail the research methods of the professor.
II. Is there room for improvement in the professor’s research methods? If so, how will you improve the professor’s research?
III. Do you think the government should legislate to tighten the grading of action movies according to the results of the professor’s study? Why?

B. Discussion (II)
Engage the whole class or arrange the class in groups to discuss the following research methods and results, and propose ways to improve the methods.

1. The researcher invites students to complete online questionnaires. The results indicate that most students believe that blogging and the use of instant messaging (IM) are effective ways to improve one’s language ability.

2. Conducting studies in three primary schools that admit average students, the researcher tested the students’ abilities in Chinese, English and mathematics, and found out (i) students taking private tuition outside classes or (ii) students who like blogging or using IM are inferior performers all around. Based on these two findings, the researcher suggested that students should not receive private tuition and should minimize blogging and using IM.

3. The medical school of a certain U.S. university conducted a study which discovered that the higher the body mass index (BMI) a teenage girl had (i.e. overweighted), the lower their self-confidence would be. Researchers suggested that in order to achieve weight reduction, help should be given to these girls to bolster their self-confidence and expand their social circle.

C. Discussion (III)
Class or group discussion
1. Have you had previous experience of purchasing certain products out of belief of product study reports? Do the effects of the product match its claims?
2. What methods can be applied in studying causation? What are the benefits/drawbacks of such methods?

Discussion & Report
After 30 minutes of discussion and preparation, two representatives from two groups of students are invited to submit a 5-minute report to other students to present and explain discussion results. The student audience can ask questions after the report.
**Explanation of Scenario**

**Correlation and cause and effect**

The key point is to discriminate between **correlation** and **cause and effect / causal relationship** (refer to: Qualifications for childbirth). Class would learn how to determine the validity of the conclusion of a study from its research methods, and learn to critically evaluate the different study results of a variety of publicly available products.

Through the data obtained from the professor in the Scenario, we know that certain things are correlated. As the research results have pointed out, youths with a liking for action movies are more likely to have criminal records and their academic qualifications are also lower on average. We thus learn that for the interviewed youths, their level of liking for action movies is related to their past criminal behaviour. Also, the level is related to their level of academic qualifications. But we cannot determine what sort of relations exists between the two: which is the cause and which the effect, or whether other factors are influencing both.

One cannot simply draw from the data collected by the professor the conclusion that action movies discourage studies and encourage violence. The study results can be interpreted in other ways, including: those with lower academic qualifications tend to spend more time on entertainment, such as going to movies; people with criminal records have a tendency to resort to violence when tackling problems, and thus have a liking for action movies, and so on.

Questionnaires are a commonly used research method. There are benefits and drawbacks to this method. Questionnaire studies are a convenient research method, because the required time and resource input are relatively less than other methods, and the information gathered is abundant and easy to analyse. The drawback is that questionnaire studies often indicate only correlation and not cause and effect / causal relationship. Many similar studies are misleading, guiding readers to misread correlation as cause and effect / causal relationship.

Class should note that in daily life, correlation is often misinterpreted as cause and effect / causal relationship. An example is the common saying “the bald millionaire”. Those who are bald very often enjoy high income. One possible explanation is that when people reach a certain ripe age they begin losing hair, and at the same time their experience entails better income. In this example, maturity is the cause of both hair loss and high income, but people easily interpret it as a causal relationship between baldness and high income.
One should also note that the results of a study may not be readily generalisable. When the attributes of an individual participant is at odds with the research population, i.e. the participant lacks representativeness, the study results cannot be generalised.

When we analyse the **sampling methods** of the professor’s research, we see that the conclusion is problematic. The professor’s research method is not entirely appropriate. Firstly, random sampling should be done over a wider range of time to make the study results more objective and accurate. Imagine if during those four weeks all major cinemas are showing action movies, then for certain most movie-going youths during that period would have to be action movie lovers. Secondly, the selected time of research overlaps with that of secondary school classes. It makes sense that students who appear around cinemas (and not in school) during school hours have higher criminal tendencies and perform poorer academically.
In Hong Kong, many families have hired foreign domestic helpers (FDHs). When choosing domestic helpers, we have certain conditions in mind: knowledge of cooking, taking care of the elderly, etc. Some of these conditions may be fair, some may appear not. When picking FDHs, some employers prefer English-speaking helpers, believing that besides caring for children, they would help improve children’s English. The question that follows is: does a cause and effect / causal relationship exist between the two, or is it simply a correlation?

A university study investigated whether having an English speaking domestic helper at home can help improve children’s level of English. The study asked students to participate in Chinese and English comprehension tests; questionnaires were then distributed to learn about the domestic background of the students, including whether FDHs are hired. The study indicates that students from families hiring FDHs perform better in English tests than those without.

From the university study data, can the class draw the conclusion “hiring an English-speaking FDH can improve the child’s level of English learning”? What can we base on to make a reasonable judgment? Class can consider whether the argument proposed was trustworthy. For example, the belief in hiring FDHs can help children improve their English – how much of it is based on that the hiring of FDHs allows children to learn more day-to-day English vocabulary, or that the creation of an English language atmosphere helps bolster the children’s confidence in speaking English? If hiring FDHs is not the contributing factor to helping children improve their English, hiring foreign domestic helpers does not contribute to improve children’s level of English.

In life we come across all manners of research conclusions. When dealing with such studies, we should take note of the research methods. Behind existing assumptions, are there other possible reasons that lead to the research results? Under careful scrutiny, certain studies present confounding variables. Confounding variables are factors outside of the factors that we are interested in studying. The existence of confounding variables affects the clarity of the implications of the research results, because they lead to a misunderstanding of the correlation between factors that we take interest in. In the above example, the family background is an obvious confounding variable that has an impact on the children’s English abilities. The research results could be attributable to better family conditions, making possible the hiring of English speaking FDHs; or that better learning resources are made available to the children. Also, the parents of such children may be better educated.
Therefore, with more family support and learning resources, children are given a better environment, material and opportunities of English learning. Is better English abilities a direct consequence of hiring FDHs, or are families hiring FDHs capable of providing better learning opportunities and resources? We cannot arrive at a conclusion of the cause and effect / causal relationship based on the research data, because the research only points to a correlation between the two.

From this example, we learn that we cannot blindly put our trust in research results. Certain **product claims** use so-called research results to support the effects of the product. Class should take note that whether the methods of such studies are appropriate. Certain products, for promotion purposes or to exaggerate their effects, deliberately adopt biased research methods to misguide readers. We should remain critical toward such claims, examine the research methods behind the conclusions, and understand what kind of conclusion(s) should be drawn from such methods; then verify if the claims fit the conclusions. Only when we thoroughly understand the conclusion could we then know how the study can be correctly applied to real life.

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**Extended information**

Families hiring FDHs have been constantly on the rise over the past years. In 1996, a total 108,568 families hired FDHs. In 2006, the number was 176,019. There was an annual rise of 5%. Although families hiring FDHs are constantly on the rise, the income distribution of these families is uneven. According to Population By-census in 2006, FDH-hiring families are often high-income families. Less than 3% of families having a median family income of $19,500 or below hired FDHs, compared with 16.2% and 33.3% of families having a median family income of $42,900 and $78,000. These figures tell us that family income is tied to the hiring of FDHs – high-income families are more likely to hire FDHs. If we compare these figures with the university study above, we realise that family income is a variable that should not be neglected. According to the figures indicating FDH-hiring proportion and family income, the mentioned assumption “better family environment leads to better English abilities among the children; and English abilities is related but not a direct consequence of the hiring of FDHs” is a valid one.
The new senior secondary Liberal Studies requires each student to conduct an Independent Enquiry Study (IES). It involves student taking initiative in the issue enquiry, which will help them develop higher order thinking and communication skills. When conducting an IES, students often utilise social scientific research methods. To make your study results more convincing, class should take note of the above discussions regarding research techniques and correlation. Also, to enhance the persuasiveness of your study, appropriate methods must be used in collecting data, evidence and different kinds of information. Take the movie study in the Scenario as an example, questionnaires have been used to collect data targeting youths aged 13 to 17 during office hours from Monday to Friday. The youths approached during this period are not representative of the general youth population. No matter how carefully the analysis has been conducted, the value of the study is insignificant. The method of data collection is an important step that determines the reliability of the study results.

If we want to investigate the topic using questionnaires: “Do students who use computer frequently believe that they have inferior social skills?” How would class design your own study, including deciding upon target subjects, and interpreting the data obtained? Here are some basic rules for your reference.

- When beginning a study, one should stay open-minded. One should not harbour fixed assumptions (for example: frequent computer uses have inferior social skills), then collect data that support such assumptions, for example targeting subjects who are habitual computer users or those who have inferior social skills. Such unfair studies would seriously affect the reliability of study results.

- The sampling must be fair. A reliable research chooses subjects randomly and broadly. Also, unless specifically designed, a research should not focus on a certain population – for example only males or females. Fair sampling results in reliable data. Class should state clearly in your reports the method or mechanism of data collection or choice of subjects, allowing the reader to learn that the research conclusions are based on objective data.

- The design of the questionnaire must also be fair. The design of the questions must be accurate. If you want to know whether “frequent computer users believe in the inferiority of their social skills”, questions such as “do you like to solve all sorts of problems through computer use?” or “do you have good habits of computer use?” are not acceptable. The reason is that both questions comprise more than one question, including: Do you
use computer? Do you like using computer? Do you use computer to solve problems? Is it a habit for you? Do you have good habits in using computer? Class should avoid using misleading or abstract questions. The scaling method (e.g. 1 to 5, 1 for strongly agree and 5 for strongly disagree) is a commonly used question format.

- Class should interpret the obtained data carefully. Reliable data does not necessarily lead to correct conclusions. For example, if the data indicates a correlation between the number of hours of daily computer use and the level of satisfaction of one’s social skills, can we determine that “computer use is detrimental to development of social skills”? This is only one of the possible explanations. The underdevelopment of social skills might also lead one to resort to computers for comfort. Other explanations and assumptions are also possible because one can only draw conclusions of correlation from questionnaire studies. Class should bear in mind that correlative data cannot be used to prove cause and effect / causal relationship.

Although questionnaire surveys often return correlative data but not proof of cause and effect / causal relationship, they are widely used in researches because of their many benefits. Firstly, when we are unclear about our scope of research and the relations between the variables within the scope, the use of questionnaires allows us to collect data encompassing diverse variables. This will help us obtain an initial idea of the scope and build a theoretical foundation for future studies. Secondly, if the objective of the research is to investigate the comments, perception and level of understanding of certain populations regarding certain issues, events or individuals, a questionnaire survey would achieve the aim. The public opinion surveys by local universities\(^2\) often use questionnaires to collect data regarding public opinion and support of the HKSAR Government, individual officials and Legislative Councillors. Thirdly, questionnaire surveys require less human and material resource input than other research methods. Through the use of questionnaire survey one can easily obtain data from hundreds of participants; this is not possible with other research methods. If resources are scarce, questionnaire surveys are often a viable choice.

**Classroom Activities**

Please refer to the activities as suggested in Scenario Discussion and Activities.

**References**


2 Public Opinion Programme, Faculty of Social Sciences, The University of Hong Kong. *HKU POP Site.* http://hkupop.hku.hk/
Scenario 6

Mathematical Formulae
**Learning Objectives**

The scenario describes a tutorial school which claims its tutorial classes can help students get the knack of using of mathematical formulae, and boost their scores in mathematics. After attending the tutorial class, a student saw improvement in her results.

**Scenario discussion**

Guiding class to reflect upon how the fallacy of “affirming the consequent” affects our daily perceptions.

1. Understand what is “affirming the consequent” and its meaning.
2. Learn how to give multiple interpretations of the same result.
3. Understand how ambiguous wordings were used in products’ claims to mislead the consumers.

**Expansive thinking**

Guiding class to reflect on how they have been misled by correlation in daily lives.

1. In daily lives, do we make inferences that “affirm the consequent”? 
2. How does “affirming the consequent” affect our processing of day-to-day matters?

**Technique Transfer and Application**

Guiding class to applying the techniques acquired from the above scenario, to discuss the following Liberal Studies issues:

*Module 6: Energy Technology and the Environment*

- How do energy problems affect international relationships, and the development of countries and societies?
Read the following scenario in detail and consider the related questions.

Dr. Ku, an authority on the teaching of mathematics, points out: if students grasp the use of mathematical formulae, they will see improvements in mathematics scores.

Recently, Lei, your best friend, saw in a tutorial school advertisement that it could help students grasp the use of mathematical formulae, without needing to do large amounts of exercise as in traditional ways of teaching. The advertisement claimed significant improvement of students’ mathematics scores in 3 months; a refund was promised if otherwise. Lei, having failed all of her mathematics tests last term, decided to enrol in the tutorial classes offered by the school. Three months later, Lei finally passed her recent mathematics test. Lei was excited and believed herself to have grasped the techniques of mathematics formulae. The tutorial school also offers English tutorial classes, which you are considering whether to join. Lei keenly recommended this tutorial school.
Suggested Activities

A. Discussion (I)

Class or group discussion

1. Is the improvement in Lei’s scores in mathematics a proof of her grasp of the use of mathematical formulae?
2. If you have decided to join an English tuition class, would you choose the one offered by this tuition school? Why?

B. Discussion (II)

Class or group discussion

1. Can you give day-to-day examples of affirming the consequent?
2. Next time when you come across similar advertisements for mathematics tuition classes, what questions would you ask to question the claimed effects?

Discussion & Report

After 30 minutes of discussion and preparation, two representatives from two groups of students are invited to submit a 5-minute report to other students to present and explain discussion results. The student audience can ask questions after the report.

C. Role play

Class will be divided in groups of 4 to 5, each act as a creative team of an advertising agency. Each group will be designing 1 to 3 advertisements selling certain products. Fallacies such as affirming the consequent and virtue by association can be included. The group will promote these products to the class, and votes will be cast to select the most persuasive advertisement.
Lei’s progress together with the advertisement of the tutorial school does appear to be exciting news. But if we think carefully, we would discover that there exist many logical loopholes that are problematic.

When considering this Scenario, class may have made a logical fallacy: **affirming the consequent**. Students who have grasped the techniques of applying mathematical formulae would naturally score better; but not all students who get high scores in mathematics have a good grasp of the formulae. Equally, obtaining a pass in her recent mathematics test does not mean that Lei has grasped the techniques of applying mathematical formulae. The fact is, she might have indeed grasped the technique, or she might not; perhaps other factors have caused the improvement in her scores – we do not have sufficient information to make a judgment.

The reasons for the improvement in scores, other than adequate learning, could be: Lei passed her test because she has joined a tutorial class and hence spent more time on studying mathematics; or that she has gained confidence in mathematics; or that her recent mathematics test is easier than last term’s, and the overall class score and passing rate improved.

Class should also pay attention to the **persuasive appeals** in the tutorial school advertisement. The tutorial school claims significant improvement in mathematics scores in 3 months, emphasises that large amounts of mathematics drilling, as in traditional modes of teaching, are unnecessary, and promises a full-refund if significant improvement is not achieved. One would notice the numerous **ambiguous wordings** in the advertisement: “significant” improvement, “traditional modes of teaching”, “large amounts” of drilling. Nevertheless, what kind of improvement is “significant”? Which practices are “traditional”? What entails “large amounts”? Who would assess the improvement, e.g. through tests conducted before and after the course? If the tutorial school sees significant improvement in your scores and you disagree, can you ask for a refund? Ambiguous wordings are a common advertising tool. Class should remain critical, and request a definition of the wordings when coming across such wordings, to avoid being misled.

Lastly, if, out of consideration of Lei’s positive comments of mathematics class, you think the English class would be on the same level, you might have committed the fallacy of **virtue by association**. In daily lives, fallacies of virtue by association are commonplace. An example is, if one of the students of a violin teacher won an award in an international competition, the performance of the teacher’s other students would also be high.
Expansive Thinking
Fallacies in daily life

Other than the example given in the Scenario, other instances of the fallacy of affirming the consequent are common in daily lives. One example is the idiom “good teachers beget good students”. Class should realise that a good student (consequence) is not necessarily trained up by good teachers, but could be a result of other factors, for example, the student’s own talents or family help. Let us look at another example from real life.

If the work performance of an employee is unsatisfactory – even failing to meet the company’s basic requirements – the employee will undoubtedly be laid off by the company. Now if an employee is laid off (consequence), it must be because the employee performed unsatisfactorily or has failed to meet the company’s basic requirements. Does class realise that the above is a clear example of “affirming the consequent”?

An employee may be fired out of any number of reasons, not necessarily out of performance or oversight concerns. On the contrary, class should learn about the reasons why individuals, or even groups of individuals, are laid off. The reasons could be an internal company issue, or environmental factors. Company policy changes, resources allocation, or the economic climate, are all contributing factors – not merely employee performance. Take the year 2008 as an example, many companies have made mass layoffs because of the global economic crisis. Facing difficulties, many businesses are forced to lay off their employees to cut costs; this is not a direct consequence of employee performance.

Similar examples are abundant, mainly because we tend to think carelessly and make conclusions rashly. To avoid the fallacy of affirming the consequent, we should examine carefully relevant data and consider all possibilities, and after analysis and comparison, make correct decisions.
The fallacy of “affirming the consequent” because A leads to B, so when B occurs, so does A:

A → B,
B, therefore A

Example: Chronic dietary imbalance leads to malnutrition.

Siu Ming is malnourished, therefore he must have chronic dietary imbalance.

This inference has committed the fallacy of “affirming the consequent”. Siu Ming’s malnourishment could be a result of gastronomic problems, other forms of illness, or other reasons.

Besides affirming the consequent, in daily lives we are prone to committing other forms of logical fallacies, for example “denying the antecedent”:

A → B,
Not A, therefore not B

Example: Chronic dietary imbalance leads to malnutrition.

Siu Keung does not have chronic dietary imbalance, therefore he does not suffer from malnutrition.

This inference has committed the fallacy of “denying the antecedent” and is not valid. The reasoning is the same as above.

“Affirming the consequent” and “denying the antecedent” are common fallacies involved in the inference and elaboration of arguments. Sometimes these fallacies are hidden in your point-of-view, and are hard to discover. Class should note the validity of other’s points-of-view, and be vigilant against such fallacies.
The logical inference techniques and fallacies are applicable in daily lives as well as in issues in Liberal Studies. This section shall look at logical fallacies from the perspective of oil. Let us look at the following inference:

If the Organization of Petroleum Exporting Countries (OPEC) limits oil export, the oil price rises.

OPEC has not limited oil export, therefore oil price does not rise.

Is this inference problematic? This is obviously a case of “affirming the antecedent”, and the inference is not valid. The rise in oil prices could be due to factors outside the OPEC reduction of oil export. For example, if an oil exporting country suffered from political unrest, the international society, for fear of unstable supply, will drive the oil price upwards. Imagine if during the riots, certain individuals blew up the major oil pipelines of an oil exporting country, oil supplies would plummet. Because the demand stays the same, the oil price goes up. Besides, speculation is common in the world oil futures market; fluctuations in oil price would occur from speculation without changes in the fundamental factors. In the recent decade, rapid industrial development in emerging markets such as China, India, and Vietnam have led to a rise in oil demand without significant increase in supply. All these factors have pushed up the oil price and are not under the control of the OPEC. Nations worldwide are working hard on researching the development of renewable energies. If breakthroughs happen, fossil fuels may be replaced by renewable energies for electricity generation, which would affect oil price. Let us see the following example:

If Iraq possesses weapons of mass destruction, the U.S.A. will surely declare war on Iraq.

Iraq does not possess weapons of mass destruction, therefore the U.S.A. does not declare war on Iraq.

What is wrong with this inference? This is a case of denying the antecedent and the inference is invalid. The proposition did not deny the possibility of the U.S.A. declaring war on Iraq out of other reasons. In fact, certain American officials admitted that the military invasion of Iraq was initiated for the latter’s rich oil store\(^1\); even the former President George Bush knew from the CIA that Iraq had no weapons of mass destruction\(^2\). This implied that even if no weapons of mass destruction existed, the US would have had launched military action towards Iraq, to cope with the domestic energy shortage.
Classroom Activities

Please refer to the activities as suggested in Scenario Discussion and Activities.

References

   By Rebecca Leung.

2. *Bush knew Saddam had no weapons of mass destruction.* By Sidney Blumenthal.
   http://www.salon.com/opinion/blumenthal/2007/09/06/bush_wmd/
Scenario 7

Voters’ Eligibility to Vote
**Learning Objectives**

The scenario describes a policy proposal suggested by a political party. The party believes that better educated individuals should be allowed to cast more votes, because their choices are more reliable, hence more beneficial to society.

**Scenario Discussion**

Guiding class to reflect upon how to analyse the assumptions hidden in the argument of the political party, and learn how to comment on the reasonableness of a conclusion.

1. Analyse arguments and identify reasonable and unreasonable assumptions.
2. Understand the difference between correlation and causation, and analyse whether the data indicates correlation or causation.
3. Learn how stereotypes can affect our judgment.

**Expansive thinking**

Guiding students to consider the issue of voting rights from another angle.

1. Apart from the wisdom of the voters, what other perspectives should we take to understand the citizens’ rights to political participation?
2. How can we judge fairly what people have the right to vote?

**Technique Transfer and Application**

Guiding class to applying the techniques acquired from the above scenario, to discuss the following Liberal Studies issues:

**Module 2: Hong Kong Today**

- What factors determine the level and form of socio-political participation by Hong Kong residents? What is the significance of their participation? Why do they have different demands? What is the impact of their demands?
Read the following scenario in detail and consider the related questions.

A certain political party proposed that the government should determine whether a citizen has the right to vote judging by his/her academic qualifications and payable taxes. The political party proposed that only university graduates or individuals whose payable taxes exceed a certain amount would have the right to vote in the elections.

The spokesman of the political party pointed out that history had taught us the one-person-one-vote system did not deliver the best leader to the people. Part of the population did not have the required wisdom or knowledge to judge the abilities of a candidate, and thus were easily deceived. Others voted arbitrarily without knowing the background, platform and vision of the candidates, resulting in the prevalence of “erratic voting”. The party believes that highly educated citizens should be given the right to vote, because knowledge and wisdom helps one discriminate between the true abilities of different candidates. Leaders chosen by better educated citizens naturally bring better welfare to the people. Besides, payable taxes represents one’s contribution to the society, therefore citizens who contribute more should be given the right to vote.
Suggested Activities

A. Discussion (I)

Class or group discussion

1. What assumptions do you believe lie hidden behind the party’s argument? Are these assumptions backed by evidence?
2. Do you consider the proposal suggested by the political party to be reasonable? Why?
3. Do you believe there are problematic areas in the party’s proposal? Try and elaborate.

B. Discussion (II) Constitutional development:

Divide class into groups to collect key suggestions by the HKSAR Government and different political parties regarding constitutional development. Analyse the assumptions behind these suggestions. Discuss the reasonableness of these assumptions.

C. Discussion (III) Social issues:

Using the same method, collect information on recent issues of public controversy (for example: certain major infrastructure, the major direction of investment development that Hong Kong should follow). Identify the assumptions in the arguments, and comment on their reasonableness.

D. Discussion (IV)

Class or group discussion

1. Have you noticed that you might harbour biases toward a certain type of people? If so what type, and what kind of biases?
2. Has anything unpleasant happened because of your biases towards people?
3. Why are biases of all kind present in our society?
4. How can we avoid allowing our approaches and attitudes towards things affected by biases?

Discussion and report:

After 30 minutes of discussion and preparation, two representatives from two groups of students are invited to submit a 5-minute report to other students to present and explain discussion results. The student audience can ask questions after the report.
E. Debate:

Assuming that you are a member of a certain city council, you are now in the middle of a discussion on the voting rights of citizens. Divide yourselves into the affirmative side and the opposing side, and make preparations in 30 minutes. Select representatives on both sides and carry out a 5-minute debate. During the preparation and debate:

- Please state clearly your stance, and use examples and arguments to support your points-of-view.
- When preparing your argument, take into consideration the counterarguments the opposing side would make, and be prepared to give responses.

F. Speech:

Assuming that you are the spokesperson of the political party, you will be giving a television speech to the public to elaborate your party’s views on limiting the citizen’s right to vote. Each group will be given 30 minutes to prepare, after which a representative will be nominated to give a 5-minute speech to the class.

In the speech:
- Please elaborate clearly your views on limiting the citizens’ rights to vote.
- Use examples and reasons to support your points-of-view.
- Please take into consideration possible questions the audience would raise, and narrate from both affirmative and opposing sides to make your argument more convincing.
- Please conclude, summarise and outline your main points-of-view and arguments in the concluding part of your speech.
- Class can learn to use eye-contact and gestures to enhance the impact of the speech.

The rest of the class, acting as the audience, may propose questions to the speaker after the speech.
Explanation of Scenario

Analysing hidden assumptions

When discussing the topic, class should take care to note that the points-of-view proposed by the political party may contain assumptions based on the stereotype of a certain kind of people. Assumptions based on stereotypes may be correct, but could also be wrong. Class should be mindful of the wrong conclusions generated from these assumptions.

Firstly, the political party assumes that knowledge and wisdom comes automatically with good education. Secondly, it assumes that only political leaders elected by wise, highly educated voters could guarantee people’s welfare. The opposing view may believe that a high education level only guarantees sound knowledge within one’s professional domain, and does not guarantee wisdom. Wise and judicious individuals from low education background do exist. The political party believes that those with poor education will vote without learning about the background, platform and vision of the candidate; those with good education will not. Would you agree to such a notion? The opposing view would say: even those with good education vote blindly, even engaging in bribery and corruption in the elections. Is this a good counterargument?

Thirdly, according to the logic of the political party, the higher one’s income the more one contributes to society. Do you agree to this assumption? Those who disagree believe: a citizen pays more taxes because of his/her high income, but this does not translate into greater contributions to society. Social contributions can take any number of forms – for instance practising and preaching environmental protection. Wealth is not necessarily an indicator of social contributions because not all contributions come in monetary terms. Do you agree to this point-of-view?

If we define constituencies not by academic qualifications, but by the functions of certain industries in society (for example teachers, fishermen, farmers, workers, doctors, lawyers), would you agree to this approach? What are the drawbacks and advantages? Do you agree that certain constituencies should be better represented to reflect their importance? What are your assumptions? Should housewives / stay-at-home dads or the unemployed be allocated a constituency?

Class should take note that stereotypes easily affect one’s judgment. Stereotypes or even prejudices are in fact common in our everyday thoughts and speech, for example we tend to consider boys stronger in mathematics, artists to be eccentric, and females to be more compassionate. Class should pay attention to whether biases have been imposed on certain types of people, and constantly reflect on whether such biases are accurate, reasonable and with good cause; and whether they affect our judgment of matters and events, leading us to wrong conclusions.
Apart from taking the above perspective on considering the proposal of the political party on the right to vote, we can look at voting from another angle. The ground of the above discussion is “how to ensure that capable leaders can be elected through general elections”. In political science, this is called utilitarianism. Utilitarianism supports the general elections of political leaders because it is believed that such kind of arrangement has the best chance of finding good leaders. It is also believed that only politicians who are elected can bring about advancement and betterment of national interest. Another camp in political science is named liberalism. They believe the right to vote is a birthright. Because a government has the power to legislate and execute, and such power limits the freedom of the people, the people must first vote to authorise the government. With the people’s authorisation, the government can exercise its power legitimately. The proposal suggested by the political party in the Scenario may still leave room for discussion under the utilitarian framework, but is unacceptable under the liberalist framework.

Looking back in history, political leaders who identify with liberalist equality and the one-person-one-vote principle are rare. In most countries with a electoral system, female voting is only gradually allowed after the turn of the 20th century\(^1\). It was not until 1948 that a global consensus was reached – in the form of *Universal Declaration of Human Rights* – that women have the same civil and political rights as men\(^2\). Apart from this, even in such a globally recognised democratic nation as the U.S.A., it was only in 1965 that an act was passed to protect the voting rights of African Americans\(^3\). In your opinion, what kind of electoral system suits Hong Kong? Why?
In fact, general elections are only one of the ways of political participation. **Political participation** refers to all actions that try to affect public policies, including economic, political and social.

One can certainly influence government decisions through voting. Referendums have been held in Denmark, Norway, and Poland to decide whether or not the nations themselves to join the European Union. But voting is not the only way to influence government policies. First, in democratic countries civilians have the right to become candidates in elections in order to participate in the political system, or influence government policies through joining events organised by political parties. Also, they have the right to voice out on issues of their concern, through such ways as assemblies, demonstrations, or even strikes. In certain situations, civilians engage in acts of **civil disobedience**, i.e. through defying unjust laws in order to rectify the situation through legal proceedings. American civil rights leader Martin Luther King was renowned for utilising civil disobedience and other non-violent means to raise American awareness on the issue of racial discrimination, and made the U.S. Government to abolish unfair racial segregation ordinances⁴.

For length concerns, the views given in this lesson are very limited. Class should gather more information about constitutional development in Hong Kong from the teacher and from other means, and try to understand the views and reasons given by the government and different political parties. We should examine carefully the assumptions behind their reasons, and determine the reasonableness of these assumptions.
Studies in political science tell us that a host of factors affect the degree and form in which civilians take part in political affairs. Understanding the extraneous factors helps to gain insight into human political behaviour. We shall try to discuss three of the factors involved, to give a preliminary understanding of factors that affect political participation.

First, imagine if you believe your actions of political participation has no effect on social affairs, would you still participate in politics? In other words, if the system or other factors instils a sense of low political efficacy in civilians, meaning they believe their actions have little effect on social affairs and government policies, the people would be less motivated to participate in politics. One example: in a certain country, the monarch has enormous power, which severely limits the functions of the parliament, including monitoring the government and influencing implementation of government policies, thus creating a weak parliament. Because popularly elected parliamentarians have minimal power, civilians become disinterested in registering as voter or in voting.

Also, social or systemic limitations impose great psychological or real hurdles for certain people intending to participate in politics. For example, in the 2008 U.S. presidential elections, the participation of an African American presidential candidate Barack Obama had resulted in a significantly increased voter turnout among the black populace. This was in stark contrast with the historical black indifference toward presidential elections. This could be because presidential candidates from major political parties have always been white-skinned, and many among the black community believe a white president would be less concerned about black community affairs and interests; they are thus less inclined to vote. Then why has there never been a black presidential candidate from major political parties before? This may be because blacks have always been treated unfairly in all aspects of life, and discrimination is common. It is difficult for an African American to become a federal senator, let alone a president. So we now know that social limitations and discrimination lessen the impetus and chances for political participation – and this is why Obama’s success captured the rapt attention of the global media.

Lastly, certain social events would temporarily spur political participation. For example, in 2003 when the Hong Kong Government made preparations to table a National Security Bill under Article 23 of the Basic Law, great controversy was ignited among the local population. In 2004, voter turnout for the Legislative Council elections was 55.6%, over 10% up from the 43.6% in 2000. In 2008, voter turnout was 45%, the second lowest on record since reunification. One can see that events of great social controversy can temporarily raise political awareness in citizens, heightening their interest and motivation in political participation.
Classroom Activities

Please refer to the activities as suggested in **Scenario Discussion and Activities.**

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**References**

Scenario 8
Dog Adoption Programme
Learning Objectives

The Scenario describes a hospital planning to introduce a mandatory adoption programme requiring all recovering patients of heart diseases to adopt dogs. The programme is based on a study that reveals that pet owners are more healthy and long-lived than non-pet owners.

Scenario discussion

Guiding class to think upon how we should use research data to make decisions, and reflect upon the application values of different types of research results.

1. Understand and discriminate between the meanings of correlation and causation.
2. Analyse the real implications of the results of the medical research, and how to apply relevant research results.
3. Learn to consider the generalisability of a research before application.
4. Before making a decision, what can we consider apart from scientific research?

Expansive thinking

Guiding class to reflect upon how science terminology and concepts affect our desires for making purchases.

1. Why do advertisements use difficult and indecipherable science jargons to help promote products?
2. When a product claims to have applied scientific concepts and contains some indecipherable substances, would it make the product more scientific and reliable?
3. What attitude can consumers take when faced with this type of advertisements?
Recently a medical research pointed out that pet owners enjoy better longevity and health than non-pet owners. Specifically, dog owners are less susceptible to heart attacks. Upon learning about the research, a hospital plans to work with an animal shelter to launch an animal adoption programme. The programme makes it mandatory for all recovering heart disease patients to adopt dogs as pets, in a bid to lower medication use and reduce medical costs. The programme tie-in promotions will also encourage more adoptions, providing new homes for abandoned dogs.
Suggested Activities

A. Discussion (I)

Class or group discussion

1. Analyse with your group mates and describe what this medical research report has told us? What has it not told us?
2. Will you support or oppose to this “dog adoption” programme? Why?
3. Assuming that the conclusions of the medical research is correct, can you explain why pet owners enjoy better longevity and health than non-pet owners?

B. Discussion (II)

Class or group discussion

1. Do you notice that we tend to put our trust in a certain type of people (such as doctors, teachers, lawyers, or judges)? What are the characteristics among those people? Why are we prone to put our trust in them?
2. When you are sick or when your health is at risk, will you try out blindly folk / food remedies that are unproven? Why?

Report

After 30 minutes of discussion and preparation, two representatives from two groups of students are invited to submit a 5-minute report to other students to present and explain discussion results. The student audience can ask questions after the report.

C. Discussion (III)

Class or group discussion

Comment on the following research results, and suggest ways of improvement:

1. In order to compare medication A with exercise and see which is a more effective method of weight reduction, we randomly arrange participants to adopt one of the two methods. The local television station is interested in the research, and interviewed and filmed the participants to report their progress. After 3 months, researchers found that exercising is a more effect way of weight-reduction. Thus we have our conclusion and recommend weight lost by exercising.
2. Mr. Wong is confident about the effectiveness of his teaching methods, and conducts a research in relation. First, he randomly picked out words from the dictionary, and asked his son, who was studying primary four, to dictate them. He trained his son using the same method every week. Three years later, he again picked out words from the dictionary and asked his son to dictate them. He discovered his son performed noticeably better. He claimed his teaching methods to be very effective.
3. Mathematics teacher Mr. Li hopes to see whether the class of primary 2B significantly improves under his teaching. He had designed a set of 10 questions of primary two level, and tested the entire class with the same set of questions every other month. He discovered that the test results of the class had improved constantly, therefore coming to the conclusion that his teaching methods had indeed worked.

4. Ms Cheung asked her students to practise English writing every week. A year later, she found that there were no significant improvements on the class’s English listening capabilities. She believed that the writing exercise had not helped raise the English capabilities of the students.

5. Mr. Chan invited two students from each class who had obtained the lowest scores in the first-term examinations to attend after-class tutorials. Half a year later, several of these students were no longer bottom scorers. Mr. Chan believed the tutorials had been effective.

6. To solve the problem of teenage drug use, a certain school had adopted a drug rehabilitation programme for students. In the beginning 80 students signed up for the programme, and after half a year only 10 students remained. These 10 students finally recovered from their drug addiction. The school announced the programme a success, and was 100% effective in helping students rehabilitate from drug addictions.

7. Ms Shih hoped to investigate whether students liked to use the computer network to submit assignments. She asked students to raise their hands to voluntarily participate in the programme. There were ten volunteers. A year later, these 10 students completed a questionnaire in evaluation of the programme. Ms Shih discovered that the students were very fond of the programme, and had given overwhelmingly positive appraisals. As a result, she had recommended the programme for the adoption of the entire school.

8. Tuition classes at Excellent Tuition School are exceedingly costly. Mr. Wong has two sons who are twins, and both are now in secondary five. To save tuition costs, he only let the elder twin take the classes, and the younger one studied the tuition notes brought back by his sibling. In the public examinations, both twins scored the same results. Mr. Wong thus believed the tuition classes to be ineffective.

9. Ms Si had written a work of reference that she believed is best for tackling public examinations. Her students believed that if the reference work was so effective, less time could be spent on studying. Another group of students at the same level did not have Ms Si’s reference work, and, not knowing which reference work was better, had spent quite a bit of time studying a variety of reference work. In public examinations, Ms Si’s students performed worse than their counterparts, therefore others considered Ms Si’s work of reference to be inferior.
Explanation of Scenario

How to apply research results?

In the above Scenario, the hospital administration staff had not critically reviewed the related research when they proposed the dog adoption programme. Both their understanding of the programme and the resulting conclusion were problematic. Class may propose critique from a number of perspectives.

The hospital has decided upon the dog adoption programme based on the results of only one research. It is against the scientific spirit to blindly put one’s trust in any single research. We should first investigate whether the said medical research comes from a reliable group / organisation? Are their research methods sound? Are similar researches available? If so, do the results or reports consistent with the results of the research on hand? Can the conclusions be applied to different countries / regions? And so on. Even if the research conclusions are correct, we should not determine solely from the research conclusion that it is applicable to all situations. If we do not sufficiently understand the generalisability of a research conclusion, we might do more harm than good.

According to the medical research report in the scenario, we only know that pet owners enjoy better health and longevity than non pet owners. We cannot determine what kind of relation exists between the two – which is the cause, which the effect, or if other factors are in play. In other words, a logical fallacy has occurred in which a causation is derived from a correlation. Better health in pet owners may be caused by a number of reasons, namely, pet owners may come from more affluent families, which enable them to afford pet-related expenditures; this affluence may, through making available better quality food, supplements and medical facilities, have a positive effect on physical health. Therefore we cannot simply conclude that because pet owners are on average more healthy, pet ownership should promote health. This is a logical fallacy. Class should remember that many researches only bring to attention the correlation; when citing studies one should be vigilant against misinterpreting research results.

There is another assumption in the Scenario: adoption of dogs can minimise treatment by medication and reduce medical costs. The above assumption has not been ascertained by the said medical research report. By proposing the above assumption, the hospital is trying to advocate that reducing medical costs is one benefit of the dog adoption programme. On the other hand, the research conclusions, on first glance, do not tell the class what distinctions there are among the study subjects besides pet ownership. The fact is, the research report have not mentioned the age, sex, occupation and health status of the two subject groups. Would it be that the research participants who are non pet owners tend to work long hours or under more stress? Or would it be that pet owners tend to exercise
regularly? We have no way of knowing. If we ignore other existing reasons that affect physical health, we easily reach wrong conclusions. We should pay attention that some may even use the research to mislead the readers. If we are doubtful about conclusions that claim support from scientific studies, we can check the original research and reflect on whether the citations have been used in a misleading manner.

Other than understanding the issue from multiple perspectives before making a decision, we should also evaluate the real benefits and influences brought about by the programme. Class can consider the following: would the caring of a dog incur additional physical and psychological burden in the patient, depriving him/her of needed rest? Would the germs brought in by the dog affect the already weak patient? Would the costs of having a pet exceed that of the original medical fees? If the patient is not a dog lover, is forcing him/her to adopt a dog beneficial? Would the dog be properly cared for?

Simply put, the 9 cases in the suggested activities demonstrate the 9 common threats to the internal validity of a study (whether research results support the relations a study aims to prove). They include:

1. History: Factors that intervene in the research (TV reporting), making it difficult to determine what causes the effect (weight reduction).

2. Maturation: The performance of participants is a result of maturation (growth or school teaching), and not necessarily a result of manipulation (Mr. Wong’s teaching).

3. Testing: The researcher repeatedly applies identical or similar testing tools; the subsequent improvement in results could be because of familiarity with the test questions.

4. Instrumentation: The use of the wrong testing tool (listening test) which does not reflect the desired change in aptitude (writing).

5. Regression towards the mean: When we choose subjects, including persons or objects, at the extreme ends of the study range (two students with the lowest score from each class), the subsequent improvement in results may come from measurement errors or other factors such as luck (e.g. the student neglected to answer one page of questions, the poor performance of the student was owing to sickness, or the student misunderstood the scope of examination). It could well be that the improvement in results is because the subject no longer neglects to answer a question (an improvement in luck). When one selects subjects at the extreme ends of the study range, one should be careful with the conclusion.

6. Mortality: When analysing the results, ignoring the substantial number of lost (departed) participants (unsuccessful drug rehabilitants who had left the programme prematurely) made the remaining participants less representative, leading to the misperception that the project was successful.
7. Selection: Subjects selected for the research possessed particular attributes (more familiar with computers, thus supportive of online assignment submission); hence results did not reflect the whole truth.

8. Diffusion: The results in the experiment group (the effects of attending tuition classes) diffused to the control group (the younger sibling studying notes of the tuition class) through certain channels (borrowing of notes), leading to a weakening or elimination of the discrepancies between the experiment group and the control group.

9. Compensatory rivalry: Because of the fear of failure, the control group worked harder to compensate for possible discrepancies (harder work for fear of a lack of good reference work), leading to results that surpass that of the experiment group. The edge of the experiment group pales in comparison.
In real life, logically fallacious researches and surveys are abundant. Class should take an objective and critical attitude towards such researches and surveys, and should avoid blindly putting your trust in those that appear trustworthy. Also, businesses would use scientific jargons in conjunction with scientific researches to give a product a more scientific air, making it appear more trustworthy.

Earlier on certain health product companies have launched what is generally known as “health water” on the market, with examples including energy water and nano-water. They aired advertisements demonstrating how the product could revive wilt flowers, and hired artists to represent the product, giving it “better credibility”. They even highlighted having conducted experiments, claiming that energy water uses energy transformation technologies to break down water clusters to its tiniest components, allowing it to easily permeate into cells. Nano-water, on the other hand, has been activated using nanotechnology, restoring water to its natural active state as small water molecule clusters, which can directly enter body cells and rapidly absorbed. Ordinary drinking water is incapable of these feats, and this gives it an edge over ordinary drinking water. The conclusion is, drinking “health water” makes us more healthy. But is this the truth? Scientists have yet to prove the relation between the size of water clusters and absorption by human body, and points out that water absorption relies on osmotic pressure. Whether water can easily enter cells depends on the concentration of impurities; pure water enters cells more readily. In usual circumstances, clear water which is free of odour, taste and toxins is water that the human body needs. The tap water provided by the Water Services Department already meets standards set by the World Health Organization, and is safe for drinking after boiling.

Class should also adopt a rational and critical stance with respect to the appropriateness of the argument put forward by the health product companies, rather than believe blindly in the experimental results. The companies claimed that energy water uses energy transformation technologies, and nano-water uses nano-activation technologies to restore water to its natural activated state, which facilitates permeation and absorption. Are the above arguments sound? Do smaller water molecule clusters necessarily facilitate absorption? Is the rate of water intake affected by other factors, including health and
water consumption habits? What other convincing evidence is there that could prove the effectiveness of “health water”?

Why do people commonly believe in scientific researches? Before believing, have the class considered who conducted the study? Is there a conflict of interests? Why would the “health water” researches be written in such specialised and complex scientific jargons, for example “reinforcing certain functions of water through physical methods”, for instance, the methods include nuclear magnetic resonance, far-infrared radiation, ultra-sound… How would the use of such terms influence consumers? Does the use of specialised scientific jargons make the researches more trustworthy?

Besides “health water”, we often hear about other products that are using obscure scientific jargons to create a “professional” and “scientific” air. “Nanotechnology” is one example. While we often hear products that utilise nanotechnology, do consumers truly understand what nanotechnology is? Does the product really utilise such technology? Can the consumer of a glass of nano-water really tell how it differs from ordinary water? Also, while certain food or milk powder claim to contain chemicals that are beneficial to the body, do we really know what are they before purchasing the product? Even if the chemicals are truly beneficial to our body, do we have to consume them? Can we obtain them from daily diet? As consumers, we have to stay vigilant against deception of such obscure scientific jargons, and blindly believe in the “scientific” value of certain products. A mysterious shroud of science jargons does not provide any guarantees.
Extended information

Nanometre is a unit of length. One nanometre equals $10^{-9}$ meters, a minuscule measurement unit for length. The essence of nanotechnology is to manipulate atoms and molecules at nanoscale level and create nanostructures with fundamentally new organisations and properties. Nanotechnologies can be applied in sectors ranging from textile to telecommunications and biomedical, to add new features or enhance performance of products. Examples include: nano-structured liquid crystal display with fast response time, advanced encapsulates, water repellent apparels with high air permeability, air purification system that removes odour and kills bacteria, and many more.

In recent years, many countries and regions, including the HKSAR Government, have set on developing nanotechnology due its enormous potential economic benefits. Since 2001, nanotechnology has been designated one of the key technology areas in Hong Kong. Two nanotechnology centres\(^1\) have been established at local universities by the Information and Technology Fund. One of the funding projects is the application of photocatalytic nano-coating in air purification system.

Classroom Activities

Please refer to the activities as suggested in Scenario Discussion and Activities.

References

\(^1\) Information and Technology Commission. http://www.itc.gov.hk/ch/area/nano.htm
Scenario 9
The Anti-science Position
Scenario 9
The Anti-science Position

**Learning Objectives**

The Scenario describes how proponents of the anti-science position believe that scientific research and technology will do us more harm than good. The detrimental effects caused by the continual development of science and technology will cause chain reactions and bring us unimaginable harm.

**Scenario discussion**

Guiding class to consider how confirmation bias can influence our day-to-day perceptions.

1. Learn about confirmation bias and its implications.
2. Learn about the importance of counterarguments.
3. Understand how assumptions have an impact on the strengths and weaknesses of an argument.

**Expansive thinking**

Guiding class to reflect on the costs and benefits of technology to environmental protection.

1. What role should technology play regarding environmental protection?
2. What attitude should we take towards environmental protection?

**Technique Transfer and Application**

Guiding class to applying the techniques acquired from the above scenario, to discuss the following Liberal Studies issues:

*Module 6: Energy Technology and the Environment*

- How do the living styles of people and social development affect the environment and the use of energy?
Read the following scenario in detail and consider the related questions.

Proponents of the anti-science position believe that scientific research and technological development has “spun out of control”. Modern science and technological applications violate the laws of nature; they have not brought about progress of the human race but have instead aggravated international contention, leading to social corruption and degeneration.

Einstein’s Theory of Relativity revealed the relations between matter and energy, enabling humans to create the atom bomb – a million times more powerful than conventional dynamite. Once detonated, its harms endure generations. To boost yield and sales, farmers and food producers have been using insecticides and chemical fertilisers in large quantities, which directly endanger our health and that of our offspring. Cars and factories around the world release large quantities of carbon dioxide leading to the “greenhouse” effect, threatening to disrupt global ecological balance. Proponents of the anti-science position do not negate the wonderful conveniences realised by scientific research and technological developments, but the above examples seem to show that they do more harm than good. If we continue on our path of scientific and technological developments, the detriments will cause chain reactions and bring us unimaginable harm.
**Suggested Activities**

**A. Discussion**

*Class or group discussion*

1. Do you think that scientific research and technological development has “spun out of control”?

2. Try to recap and explain the arguments and conclusions of the proponents of the anti-science position. Do you consider these arguments and conclusions correct? Why?

3. After discussing with your group members, has your perception of scientific research and technological development remain unchanged? Why?

**Discussion and report**

After 30 minutes of discussion and preparation, two representatives from two groups of students are invited to submit a 5-minute report to other students to present and explain discussion results. The student audience can ask questions after the report.

**B. Debate:**

Let’s assume that you are a Legislative Councillor. You are now in the middle of a meeting discussing whether huge amounts of funding should be allocated for scientific and technological development. The Councillors are divided into two camps: one believes that science and technology is the driving force for human advancement; the other believes that technological developments have already brought great disasters upon us, and should be stopped. Please divide yourself into affirmative and opposing sides. After 30 minutes of preparation, representatives from each side will be selected to conduct a 5-minute debate. During the preparation and debate:

- Please present your points-of-view clearly and support your views with examples and arguments.

- Note that when preparing argument on one’s own side, one needs to consider the counterarguments that your opponents would make, and be prepared to respond.
C. “Guessing the rule” activity

1. Activity procedures
   (i) Class is divided in groups of 5 to 6, with one group leader and the rest members.
   (ii) Teacher secretly informs the leader of the rules (by way of printed notes).
   (iii) Each member attempts to guess the rules by filling in the form below. S/he should do it in private without letting other group mates see the guessed progression (3 numbers), or whether they fit the group leader’s rules.
   (iv) Members should fill in the form below individually:

<table>
<thead>
<tr>
<th>My guessed progression (3 numbers)</th>
<th>Whether they fit the rules (√ or ×) (filled in by group leader)</th>
<th>My guessed rule</th>
<th>Percentage of correct guesses I may have made</th>
</tr>
</thead>
<tbody>
<tr>
<td>2, 4, 6</td>
<td>√</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   (v) To avoid influencing other members’ guesses, all members are only required to put numbers and other content on the form; the group leader should only add a √ or a × to indicate whether the progression fits the rule, and not allow other team members to learn the results.

<table>
<thead>
<tr>
<th>My guessed progression (3 numbers)</th>
<th>Whether they fit the rules (√ or ×) (filled in by group leader)</th>
<th>My guessed rule</th>
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</tbody>
</table>

   (vi) Upon explaining to group mates the rules of the activity, the teacher says, “To further explain the activity, I will give an example by making the first guess for you. Your guess is 2, 4, 6. Write 2, 4, 6 in the first column, and because it fits the rules that I have given the group leader, your leader will write a ‘√’ beside your answer. You can fill in the rules you’ve guessed, and the percentage of correct guesses that you believe you have made. You may then propose a second arithmetic progression to guess the rules.”
(vii) Group mates can make multiple guesses until s/he believes the group leader’s rule has been solved. When most group mates believe they have made correct guesses, the activity may stop.

(viii) When most have completed their activities, the teacher leads a discussion among the whole class and looks at the rules that students have guessed.

2. Implications of the activity (for teacher’s reference only; students should not be allowed to read the following before the activity)

(i) The secret rule that the teacher gives the group leader is: “The numbers increase in the progression”. The teacher and group leaders should not only give examples belonging to “additions of 2”, for fear that it would affect members’ guesses.

(ii) The answers of a student may be as follows:

<table>
<thead>
<tr>
<th>My guessed progression (3 numbers)</th>
<th>Whether they fit the rules (√ or ×) (filled in by group leader)</th>
<th>My guessed rule</th>
<th>Percentage of correct guesses I may have made</th>
</tr>
</thead>
<tbody>
<tr>
<td>2, 4, 6</td>
<td>√</td>
<td>每一數字加2</td>
<td>20%</td>
</tr>
<tr>
<td>10, 12, 14</td>
<td>√</td>
<td>加2</td>
<td>60%</td>
</tr>
<tr>
<td>100, 102, 104</td>
<td>√</td>
<td>加2</td>
<td>100%</td>
</tr>
<tr>
<td>0, 2, 4</td>
<td>√</td>
<td>加2</td>
<td>100%</td>
</tr>
</tbody>
</table>

(iii) When the teacher and group leaders use 2, 4, 6 as the first example, many students believe that the rule is “addition by 2”, and believes that they are 100% correct.

(iv) We can see that after multiple “verifications”, students become 100% confident in themselves that they have guessed the rule “addition by 2”. This will be proven incorrect later on. (The correct rule is “the numbers increase in the progression”)

(v) When we believe ourselves to be right, we tend to put to much confidence that the information that follows shall support ourselves. This is an example of “confirmation bias”.

(vi) We have to realise that the correct guess of the rule requires examples that fit as well as examples that do not fit the rules. This is helpful in guessing rules, and is a method often adopted by scientists. Finding examples that fit the rules alone is not enough.

Note: This activity is based on information from www.devpsy.org.
2. Worksheet to be distributed to class

Guess the rules of my arithmetic progression

The teacher has a rule for the arithmetic progression (3 numbers), and has told your team leader. You are to guess what this rule is. To guess the rule, you can propose a progression of 3 numbers. The leader will tell you whether your progression fits the rule. When guessing, don’t tell your team members; simply write it down on paper. Your team leader will indicate whether your progression fits the rule with a “√” or “×”. After learning the result, please guess and write down the rule, and fill in the percentage of correct guesses you think you have made. The teacher has helped you fill in the first guess. You guessed 2, 4, 6, and your teacher and leader tell you that it fits the rule.

<table>
<thead>
<tr>
<th>My guessed progression (3 numbers)</th>
<th>Whether they fit the rules (√ or ×) (filled in by group leader)</th>
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</thead>
<tbody>
<tr>
<td>2, 4, 6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Explanation of Scenario

Confirmation bias

The discussion focus of this topic is to encourage students to apply critical thinking to analyse the arguments proposed by proponents of the anti-science position. Through raising counterarguments and analysing the logical weaknesses in the argument, they are able to determine whether the conclusion is reasonable.

A point-of-view comprises the claims, position and views an author holds in relation to the topic, and is not underpinned by reasons. A reason is the grounds / justification the author uses to support his/her argument. Note that reasons can be facts, or they could be mere theories. An argument is a process of utilising reasons to illustrate a point-of-view; the process necessitates one conclusion and one reason in support of the conclusion.

When making an argument, we often neglect the underlying assumptions. We might at times touch upon these assumptions, but we do not necessarily explain them in detail. But we have to understand that assumptions are part of the argument. Students should note that while some assumptions may be true, others are unproven or false. We should carefully weigh, evaluate and explain the truthfulness of different assumptions, and how they affect the conclusion. In the Scenario, proponents of the anti-science position believe the detrimental effects caused by the continual development of science and technology will cause chain reactions and bring us unimaginable harm. Their assumptions are: 1) the continual development of science and technology shall only bring us even greater harm; 2) such harms will unleash a chain of harmful reactions. The above assumptions are groundless. If scientific and technological advancements continue at great speed, better ways of protecting the environment will be found, instead of only bringing greater harm. Class should note that we cannot say science is bad by nature simply because science has brought us harm; therefore scientific research should be banned. Such arguments as “computers are bad because people tend to depend on them; without computers people can’t do anything” are invalid. It is invalid because without computers, we cannot enjoy its benefits and convenience, but we still can do many things. So “we can’t do anything” without computers is a groundless assumption.

Class should pay attention that proponents of the anti-science position have made an error in their argument which is called “confirmation bias”. Confirmation bias refers to putting forward reasons that only support one’s argument or is favourable to the position of one’s side, and in doing so ignores the opposing side’s reasons or reasons that challenge one’s side. For example, anti-science proponents highlight the damages caused by scientific research and technology, and avoid addressing their positive applications and
the knowledge they bring – e.g. medicine, aerospace technology. This is an example of confirmation bias.

In day-to-day life, we tend to look for reasons that support our arguments, and forget about the counterarguments. In the Scenario, the argument of the proponents of counter science position does not embrace valid counterarguments. This seriously undermines the completeness of the argument, and leads to incorrect conclusions. When we disagree with another’s arguments, or when his/her arguments are fallacious (putting to question the correctness of another’s argument), we can propose counterarguments to challenge the opposing points-of-view. Counterarguments can simply be alternative arguments presented from another perspective. Even if an argument seems logically sound, class should become used to thinking in multiple perspectives, and actively propose counterarguments for arguments of your own and those of others, to avoid a biased perspective.

**Point-of-View**

**Reasons**

**Confirmation bias**

**Argument**

**Counterarguments**

**Assumptions**

**Topic**
Expansive Thinking

How do we consider the costs and benefits of technology to environmental protection?

Advancements in science and technology bring about a more developed society. Without present-day science and technology, our society would be very different. Try imagining that we do not have agricultural technology such as chemical growth enhancers and pesticides, global agricultural produce would plummet and be unable to sustain the booming world population; serious food problems would ensue. Anti-science proponents in the Scenario do not deny scientific and technological developments would bring humanity great conveniences, but believe that the harms override the benefits. In neglecting to mention the positive applications of science and technology, they have committed the error of confirmation bias. Science and technology themselves do not significantly affect the environment. The harms to the environment are the result of human’s inappropriate use of science and technology. Humans have not considered the negative effects of the methods and usage of such. If humans can put science and technology to good use, we can significantly reduce the harms to the environment.

Bjørn Lomborg had presented numerous examples of confirmation bias in his work Cool It: The Skeptical Environmentalist's Guide to Global Warming. An example was that Lomborg quoted that the United Nations Intergovernmental Panel on Climate Change (IPCC) predicted that the global temperature in 2100 would have risen 2.6°C. He believed it to be a raise that humans could adapt to. However, what he neglected to mention was that what IPCC had given was more than a temperature; it was a temperature range. The real prediction by IPCC was that the rise in temperature would be in the range of 2.6°C to 5°C. In his argument, Lomborg had only given the lowest estimate. First, if class would think carefully, you would see what IPCC had provided was only an estimate. Teacher should guide class to carefully consider Lomborg’s claim: if he cited a raise of 5°C as his argument for a humanly adaptable temperature, would it make a difference when compared to his citing of 2.6°C in his book? By using different reasons, the same argument would vary in strength. By strategically choosing the lowest value in the IPCC estimate range in his argument for “the temperature raise is one that the humanity can adapt to”, Lomborg had diminished the impact of global temperature rise and lent strength to his argument. This example illustrates how the use of information directly affects the strength of an argument.

Class can think of examples in daily life where confirmation bias occurred in the mass media. For example, earlier there was a newspaper article about the Jockey Club Creative
Arts Centre – an arts amenity redeveloped from an industrial complex in Shek Kip Mei. In the article, the reporter quoted from his three visits to the centre when he discovered a large number of vacant units, and questioned whether the artists are wasting social resources. An artist criticized the article for inaccurate reportage and requested an apology from the newspaper. The reporter focused on the observations of his three visits and had come to the conclusion that artists are wasting social resources. Because the report lacked in objectivity, readers were prone to a mistaken impression of the event.

People usually harbour unrealistic assumptions about environmental protection: “environmental protection contradicts economic development”; “the pollution of the environment is a necessary evil”; “if polluters were to pay for all extrinsic costs, it will impede economic development; “some types of pollution will dissipate naturally; even if they are not addressed now, the posterity will figure out some way to deal with them”; or that “politicians and academics will make the wisest choices and ordinary citizens need not worry”. To come to correct conclusions we should more often approach an issue from the other sides to avoid confirmation bias; we need to come up with counterarguments and attempt to look at things from a macro perspective. At times, if we doubt or believe the counterargument that another makes is erroneous, we can propose a rebuttal. For example, some may propose counterarguments saying that environmental protection hinders economic development and weakens Hong Kong’s competitiveness on the world stage. We can propose the following rebuttal: If we encourage the research and application of renewable energy, and see environmental protection as a new direction of economic development – examples of which include the development of eco-industries – we will be able to promote sustainable economic development.

Confirmation bias is a common practice in our daily lives. Sometimes we may unconsciously neglect information that does not support our views or arguments. This is an approach commonly adopted by advertisements such as the persuasive appeal. We have to pay greater attention to information of various topics and avoid relying on only one source of information. For example, we can pick issues in life or in current affairs and propose counterarguments and rebuttals. Through habitual practice, one would develop the capabilities of a rational critical thinker.
According to experts, over the past hundred years, about 95% of all resources and research are dedicated to exploiting the earth’s resources; only 5% are spent on dealing with the wastes resulting from the exploitation. Environmental issues worsen with the Industrial Revolution; such unbalanced development is the culprit for environmental pollution and damages to the eco-system. Environmental protection requires not only technology, but education to raise people’s awareness. One has to realise that the beauty of nature is not to be taken for granted; only by changing the shared values of life can environmental protection be truly feasible.

Presently electricity is generated through burning fossil fuels such as coal and oil. The availability of fossil fuels, however, is finite. To replace fossil fuels, new forms of energy coming from natural resources have been made possible through advanced technology – renewable energy which is naturally replenished, inexhaustible and clean. The use of renewable energy does not produce carbon dioxide or other greenhouse gases. Greenhouse gases will accentuate the insulating effect in the upper atmosphere, prevent dissipation of heat from the earth at the usual rate and will result in global warming. Using renewable energies to generate heat or electricity creates a much smaller environmental imprint than using fossil fuels. And unlike fossil fuels, renewable means of generating electricity like wind or solar power do not release pollutants including nitrogen oxides, sulfur oxide and particulates. They do not pose harm to humans, and are safe particularly for people with chronic diseases. Renewable energy technologies suitable for Hong Kong include solar and wind power, and energy generated from waste.

Some people believe that environmental protection costs a lot of money. In fact, everyone should practise Green Living in our daily lives – reduce paper waste, use of public transportation in place of private transport, learn about electricity labels to choose low energy consumption appliances, and help boost energy efficiency. Researchers discovered that the herding industry is the one major source of carbon emission. Have you thought about reducing meat consumption to reduce carbon emission? Remember: a bright future in our society is realised through the efforts in each and every one of us.

Over the past 400 thousand years, the carbon dioxide level on Earth has remained steady until the Industrial Revolution when it saw a rapid rise. The cyclic change of the Earth’s orbit (called “Milankovitch cycles”) is believed to be the driving force behind the ice ages that cycle every 100 thousand years. The change in the climate system is owing to natural or internal forces as well as a response to changes in external forces. Such external forces

Extended information

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include human and non-human factors, for example solar and volcanic activities, and greenhouse gases. Many climatologists have agreed that the Earth is becoming warmer in recent years. The reason for this change is a highly popular research topic. Consensus among scientists is that greenhouse gases are the main contributing factor to global warming. But there are still ongoing debates beyond the scientific realm.

When other conditions remain constant, the carbon dioxide and methane emissions help elicit a raise in surface temperatures as these greenhouse gases contribute to a natural greenhouse effect. Without them, global temperature will plummet by 30°C, making the Earth inhospitable. Therefore, we should not debate on the validity of the global warming theory; rather, we should focus on the ultimate effect produced by the raise in atmospheric carbon dioxide and methane. Methane is a major component of natural gas, and produced mostly by living organisms, or leaked from natural gas pipes or infrastructure. Some biological sources of methane are natural, for example termites. Other sources are created by the increase in human farming activities, for example rice agriculture. Recent evidence indicates that forests may also be a source of methane. If that is true, it will be counted as an additional contribution to the natural greenhouse effect—an effect that is non-human instigated.

An important example of the climate feedbacks is the ice-albedo feedback. The increase in atmospheric carbon dioxide leads to increased surface temperature which causes polar ice caps to melt. Then, land and open water cover more areas of the Earth which in turn, reflect less solar radiation and absorb more. This exacerbates the warming effect, which in turn accelerates the warming process, causing more ice to melt and sustaining the cycle. Researches in climate behaviour point out that even when greenhouse gases maintain their current level, average global temperature may still see a rise of 0.5 to 1°C.
The United Nations Intergovernmental Panel on Climate Change (IPCC) points out clearly that humans are the culprit for global warming. It warns that humans have only eight years left to implement measures to curb greenhouse gas emission to prevent the continual deterioration of global warming, to avert disaster. If prompt action is not taken, countless lives will be under threat and over half of the animal and plant species could be wiped out due to eco-disruptions6.

Hong Kong is a society deeply influenced by materialism and consumerism. Our consuming habits could have positive or negative impact on the calculation of carbon footprint. Undoubtedly, material consumption increases the carbon footprint. Each year, the huge influx of goods plus the 40 million visiting tourists impose a significant carbon footprint on the city. Hong Kong is ailed by over-abundance, which continuously boosts our carbon footprint. The number was perhaps somewhat larger than the 6.5 tonnes per capita per year that Government statistics indicated. On the other hand, while keen on shopping, Hong Kong people are capable of remaining rational; they can reduce their carbon footprint not only by controlling their consuming tendencies, or choose low carbon products, which could well become the mainstay products for manufacturers. The research results from the WWF also reflected the same phenomena – 90% of the interviewees said that they were willing to review their lifestyles, and contributed their efforts to slow climate change.

In December 2009, world leaders gathered at Copenhagen to attend the United Nations Climate Change Conference 2009. The aim of the conference was to negotiate a global climate agreement to replace the Kyoto Protocol (as of May 2000 it had 184 member parties) but which would expire at the end of 2012. Nonetheless, the dangers of climate change threaten every human being on Earth, and we cannot place our hopes on a consensus on the problem of reducing emissions and the signing of a legally binding agreement.

The sustainable development of the world depends upon the collaborative efforts of all global citizens. Besides changing our habits of consumption, we can simply begin with our day-to-day habits in order to live a low-carbon life, e.g. we can cut down on unnecessary energy consumption, reduce the use of non-degradable and environment-polluting materials like PU foam, reuse plastic bags, classify trash for convenient recycling, donate used clothing to charities, adjust the temperature of air-conditioning, and take public transportation.
Development and environmental protection must be balanced. Environmental protection requires the joint participation of every industry and organisation in society. If everyone participates, environmental resources will be conserved. To balance development and environmental protection, each of us should share the responsibility of protecting the environment.

Over the past years, the world has given significant attention to global warming\(^7\). People are highly concerned about the various scientific explanations for global warming, which sparked political and economic debates. Efforts on the control of greenhouse gas emission on the part of developing countries such as India and China also set off great controversies. According to numerous reports, China’s carbon dioxide emissions mainly come from coal power plants and automobiles. The volume is expected to exceed the U.S.A. in the next few years\(^8,9\). With the per capita greenhouse gas emission one-fifth of that of the U.S.A., China believes it should have a smaller share of responsibility on emission control. The U.S.A. claims that if it has to shoulder the costs of emission reduction, so does China\(^10,11\). India, on its way to becoming one of the largest greenhouse gas emission countries, will face the same problems as China.
Student reflection

- In order to support your own arguments, would you neglect to consider an event from multiple perspectives?

- Are there individuals around you who tend to selectively give evidence to support his/her ideas? Give some examples.

- Why are we prone to confirmation bias in thinking?

Classroom Activities

Please refer to the activities as suggested in Scenario Discussion and Activities.

References

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